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Store Food : A Case Study of the Food Supply in an Aboriginal Community from 1988-1995

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Store Food: A Case Study of the Food Supply in an Aboriginal Community from 1988–1995

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マーケット食品とアボリジニ社会

——マニングリダにおける食料供給（1988～1995）——

五 島 淑 子

The overall aim of this study was to clarify the characteristics of dietary patterns in Maningrida over the period 1988 to 1995, based on food supply records from the Maningrida store. I used the 'store-turnover' method to achieve this aim. I estimated the food supply per capita in Maningrida from 1988 to 1995 using Australian Bureau of Statistics (ABS) Census data.

Maningrida store-food ordering data (not including fruit and vegetables) covered the period 1988 to 1995. The frequency of orders and the variety of items tended to increase during this period. I classified food into the following 12 groups: beverages; canned food; dairy products; eggs; frozen food; grain products; convenience food; meat; oils and fats; seasoning; sugars; and other foods. I also examined changes in the annual Maningrida store-food orders over this period.

Fruit and vegetable data covered the period from 1993 to 1995. Fruit and vegetables were delivered by barge and by air, and the frequency of orders increased over this three-year-period. However, the supply of fruit decreased slightly, and the supply of vegetables increased

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Key Words : Australian Aborigine, Arnhem Land, Maningrida, store food, food supply, health

キーワード : オーストラリア・アボリジニ, アーネムランド, マニングリダ, マーケット食品, 食料供給, 健康

over this period.

I examined the pattern of Maningrida store food orders per capita per day from 1988 to 1995. Maningrida store orders over this period, when compared to the apparent per capita consumption in Australia (1995–1996), suggest that the supply of sugar, powdered milk and tea was much higher, and the supply of fish, fruit and vegetables much lower in Maningrida than in the wider Australian population.

I examined Maningrida store tobacco orders over the period 1988 to 1995. The per capita orders of cigarettes and loose tobacco appear to have declined over this period.

I make the following recommendations for the store manager. There should be:

- (1) an increase in the variety of food available;
- (2) an increase in the supply of fruit and vegetables; and
- (3) a reduction in the supply of sugar products.

I make the following recommendations for customers of the store. Customers should:

- (1) eat a greater variety of food;
- (2) reduce consumption of sugar products;
- (3) consume plenty of water;
- (4) eat more fruit and vegetables; and
- (5) eat more bush food, and grow vegetables if possible.

マニングリダは、オーストラリア北部準州アーネムランドにあるコミュニティのひとつである。マニングリダにあるスーパーマーケットの1988年から1995年の8年間（野菜・果物類については1993年から1995年の3年間）の注文伝票を資料とし、食料供給の特徴およびその変化を、注文量の面から分析した。

マニングリダ・マーケットにおける食料の注文は、8年間のうちに品目数が増え、食品の選択の幅が広がる傾向が認められた。オーストラリア国民の1人1日あたり食料消費量と比較した結果、マニングリダでは、野菜・果物類、魚類が非常に少ないこと、砂糖、粉ミルク、紅茶が、かなり多いことなどを明らかにした。また、健康に関連の深いタバコの注文量が減少していることを明らかにした。

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1.0 INTRODUCTION

1.1 Background

Australian Aboriginal and Torres Strait Islander people continue to experience much poorer health than the general Australian population (ABS 1997). Life expectancy at birth is 14–20 years less for Indigenous Australians than for other Australians (AIHW 1998). The high prevalence of nutrition-related problems, such as non-insulin-dependent diabetes and cardiovascular disease are major health problems in Aboriginal communities (NHMRC 1997).

There is relatively little quantitative data available about dietary intake in Aboriginal communities and most of previous studies had small sample size

(Harrison 1991). These studies include the American-Australian Scientific expedition to Arnhem Land (McArthur 1960), a dietary survey in Darwin and other areas (Wilson 1953), studies of outstations in Arnhem Land which showed the importance of both bush and store food in this setting (Meehan 1982; Altman 1987), and a study of store foods (Young 1984).

More recently, the store-turnover method has been used to obtain quantitative information about diet and nutrition in remote Indigenous communities (Lee *et al.* 1994a; 1994b). These studies have important implications for community-based nutrition intervention programs.

I had previously analyzed Maningrida store orders data for the first half of 1988 (Goto 1991). This work showed that flour and sugar dominated supply, with fruit, vegetables and fish in limited supply. The supply of energy and protein was adequate, but there was a lack of minerals and vitamins.

1.2 Significance of this study

There are relatively few studies of dietary patterns and nutrition among Indigenous communities in Australia. Store food plays an important role in the contemporary diet of Indigenous Australians living in remote communities. Studies of diet and nutrition among Indigenous communities at both the community and individual level are vital for the development of health policy.

This community-level study is important because it is longitudinal in nature and the information obtained may help relevant agencies in Maningrida to improve nutritional standards in the community. Levels and changes in the supply of items such as sugar, soft drinks and tobacco, have been identified, and this information is key importance for the rational development of preventive health strategies.

1.3 Ethical matters

I tried to follow standard ethical guidelines during this work, and was assisted in this regard by my research advisory group comprising staff from Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) and Australian National University (ANU) (NHMRC 1991). I received permission to conduct my research in Maningrida from all relevant community organisations in Maningrida prior to my field trip in 1998. These were the Maningrida Council Inc., Bawinanga Aboriginal Corporation (BAC), and the Maningrida Progress Association.

2.0 AIMS AND METHODS

The aims of this study are:

- (1) To clarify the characteristics of dietary patterns in Maningrida based on food supply orders from the store; and

- (2) To identify any changes of diet from 1988 to 1995 in Maningrida.

For this report, I analyzed store order data for 1988–1995 using standard Excel software. The data included date ordered, food items ordered (e.g. flour, sugar, soft drinks, canned food, frozen food), and quantities ordered. Data for fruit and vegetables was only available for the years 1993 to 1995. I also analyzed store order data tobacco because of the special risk of smoking for health.

I used regression analysis of ABS Census data for 1986, 1991 and 1996 to estimate the Maningrida population (including non-Indigenous people) each year from 1988 to 1995, as shown in Figure 2-1. The Maningrida population growth rate was very steady during the period 1986–1996, averaging an increase of 68 persons per year.

I carried out a field work in Maningrida from 2nd to 7th September 1998. During this period, I visited the Maningrida Council Inc., the Maningrida Progress Association, the Bawinanga Aboriginal Corporation, the Maningrida Health Centre, the Maningrida Community Education Centre, and the Maningrida Arts and Culture Centre.

I interviewed the current store manager, the past store manager who had a different job in Maningrida, and other relevant people.

To calculate the store food orders per capita, I did the following:

- (a) entered the store order data into an Excel spread sheet;
- (b) identified the foodstuffs, and examined the amount (kg or L) and order unit;
- (c) weighed small and medium size fruit and vegetable pieces using a portable scale;
- (d) organized store orders by year;
- (e) converted the amount of each order to a weight or volume;
- (f) calculated the annual orders by weight or volume;

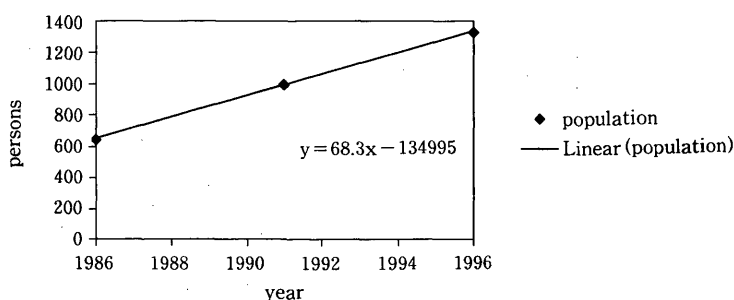


Figure 2-1 Estimation of the population in Maningrida using regression analysis*

* Source: ABS 1998a; 1998b; 1998c.

- (g) classified the food into groups (*refer to* section 5 for details);
- (h) estimated the population in Maningrida from 1988 to 1995 using regression analysis (*refer to* above); and
- (i) calculated the food orders per capita per year and per day thus:

$$\text{Food orders per capita per year (kg or l)} = \text{annual orders (kg or l)} \div \text{estimated population};$$

$$\text{Food orders per capita per day (gm or ml)} = \text{annual orders (kg or l)} \div \text{estimated population} \div 365 \text{ days} \times 1000.$$

I used a similar method to calculate cigarette and loose tobacco per estimated smoker orders. The smoking population of Maningrida was estimated by:

- (a) assuming that people aged 15+ years constituted 59.1% of the total Maningrida population in 1991 (ABS 1998b);
- (b) assuming that 61.4% of the population in the Jabiru region aged 13+ years in 1994 were smokers (ABS 1996); and
- (c) The estimated smokers in Maningrida = (estimated population of number of people 15+) \times (proportion of that number that smoke, based on the data for the 13+ age group).

For comparison with the results of store food orders per capita, I used 'Apparent dietary intake in remote Aboriginal communities' (Lee *et al.* 1994a) and apparent per capita consumption in Australia (ABS 1998d). The supply of bakery food, take-away food, shop food, and traditional foods are not included in this report.

3.0 THE STUDY COMMUNITY

3.1 Maningrida-location, climate and brief history

Maningrida is a community located at the mouth of the Liverpool River, approximately 300 km east of Darwin, on the northern part of Arnhem Land in the Northern Territory (Figure 3-1). It takes about 50 minutes to travel by light aircraft from Darwin to Maningrida.

Maningrida has road links with Raminginang to the east (approximately 150 km), Oenpelli to the west (approximately 250 km) and Darwin further to the west (approximately 550 km). However, these road links are not usable for approximately 3-4 months per year during the peak of the wet season (Burns 1995).

The climate is part of the Asiatic monsoon system. It is characterized by two contrasting seasons—the wet and the dry. The wet season extends from November to March, and the dry season extends from May to September

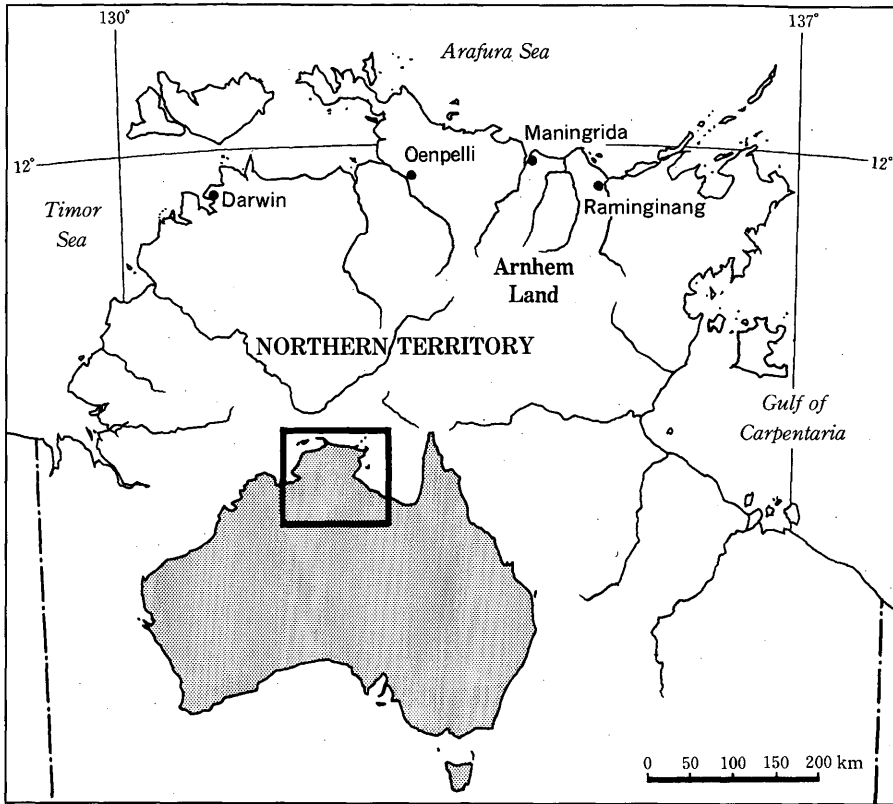


Figure 3-1 Location map of Maningrida in the Northern Territory*

* Source: Meehan 1982.

(Meehan 1982).

Maningrida was established as a trading post by the Northern Territory administration's welfare branch in June 1949, but was closed in November 1949. Maningrida settlement was established again as a trade post in 1957 but with a medical centre attached (Hiatt 1965; Altman 1987).

The town council established an outstations resource centre as the outstations movement during the 1970s. By the mid-80s, the town itself was well supplied with public buildings (e.g. a school), houses, and standard utilities such as reticulated electricity, water and sewerage.

The Maningrida community now has a health clinic, store, take-away shop, bakery, police station, post office, school, and other public buildings. There are three major community organizations in Maningrida. These are the Maningrida Community Council (MCC), Maningrida Progress Association (MPA), and Bawinanga Aboriginal Corporation (BAC). MPA operates the store, bakery, an aviation charter business, and a store truck servicing the

outstations. BAC is the homeland community resource centre (Burns 1995; Schwab 1998).

3.2 Food in Maningrida

The people in Maningrida get food from several sources, however, they mainly buy food from the store. There is a take-away shop named Hasty-Tasty and a bakery, and people can buy lunch at the school canteen. Some bush food is also eaten. Sometimes people travel to outstations and eat store food which is supplied to outstations via the store truck run. They also get food from Darwin or the neighbouring communities, as summarized in Figure 3-2.

The school canteen provides hot meals, juice, fruits, soft drinks, sandwiches, ice cream and potato chips for sale to the Aboriginal community (Schwab 1998). The take-away shop provides fried chicken, chips, hamburgers, soft drinks, ice cream and tobacco. In 1998 there were other sources of food supply for Maningrida people, such as bread from the nearby town of Jabiru, and a visiting food take-away truck.

Although many non-Indigenous people in Maningrida order food directly from Darwin, they do sometimes buy food from the store. The people in outstations get food from the bush, store-food from the outstations truck run, and also directly from the store in Maningrida.

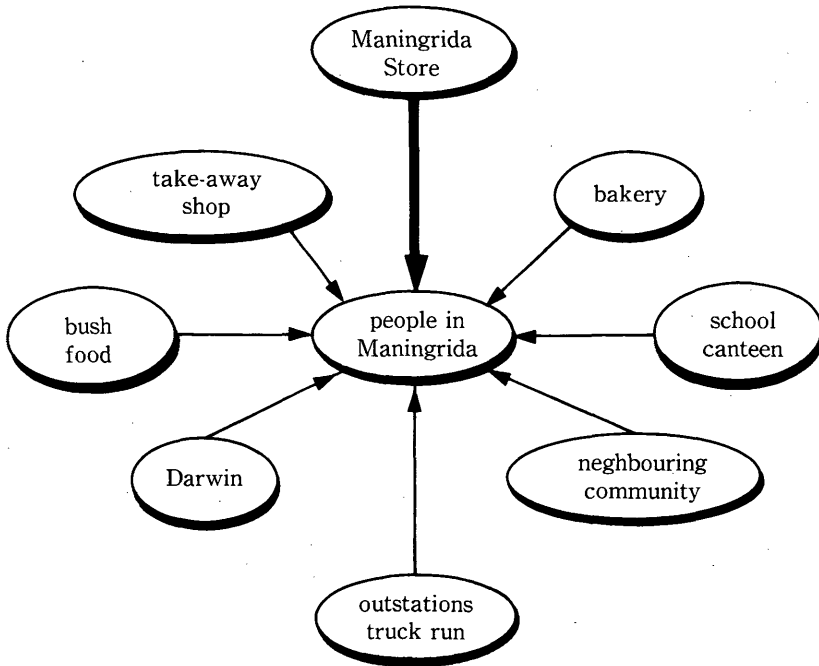


Figure 3-2 A summary of the food supply in Maningrida

3.3 Store orders

Maningrida store is run by the Maningrida Progress Association. The opening hours are from 9 to 12 a.m. and 2 to 5 p.m. on weekdays (and from June 1998 the store was open on Saturday morning). The store manager orders goods from a distributor in Darwin.

The store goods are divided into five categories on the store order form: 'grocery', 'frozen', 'chilled', 'meat', and 'fruit and vegetables'. Groceries are transported to Maningrida from Darwin by barge. The grocery orders include mainly daily food, necessities and tobacco, with food being the larger proportion. Fruit and vegetables are transported by air and by barge.

Store food for the outstations truck run is ordered by the Maningrida store manager, but separately from the main store orders. Flour for bread made at the bakery in Maningrida is ordered separately from the store. Maningrida is a 'dry' community, and there are no orders for beer and stronger alcoholic drinks.

4.0 POPULATION

4.1 Population in Maningrida

Maningrida is one of the largest remote Aboriginal communities in Australia. According to ABS Census data (Table 6-1), there were 1329 people living in Maningrida in 1996. This included 112 non-Indigenous people in Maningrida itself, and 524 persons living in outstations. Maningrida had 32 outstations in 1998. The people in outstations live a more traditional lifestyle than those living in Maningrida.

Burns (1995) estimated the population in Maningrida in 1995 using Maningrida Health Service data. He found the resident Aboriginal population

Table 4-1 The population of Maningrida and outstations*

	Maningrida			Maningrida outstations
	1996	1986	1991	1996
Indigenous				
Aboriginal	594	891	1191	521
Torres Strait Islander	0	3	6	0
<i>Total</i>	<i>594</i>	<i>894</i>	<i>1197</i>	<i>521</i>
Non-Indigenous	50	n/a	112	0
Not stated	2	n/a	20	3
Total	646	997	1329	524

* Source: ABS 1998a; 1998b; 1998c.

to be 1345. Another 737 Aboriginal people lived in outstations. There were 77 non-Aboriginal people residing in Maningrida.

There is considerable population mobility, as some Maningrida people move out of the township temporarily during the dry season, and some outstation people move in to the town during the wet season (Altman 1987).

The ABS censuses were conducted on 30 June 1986, 6 August 1991, and 6 August 1996, during the dry season, when the population of Maningrida is relatively low.

4.2 Age and sex structure of the population of Maningrida and outstations

Figure 4-1 shows the population pyramid for Maningrida in 1991, and Figure 4-2 shows it for 1996. Figure 4-3 shows the population pyramid for Maningrida outstations in 1996.

These population pyramids are indicative of a relatively high birth-rate and premature mortality. In 1991, 40.9% of the Indigenous population in Maningrida was aged less than 15 years. The comparable figure for Maningrida in 1996 was 41.3%. The population pyramid for the outstations shows 44.0% was aged less than 15 years in 1996.

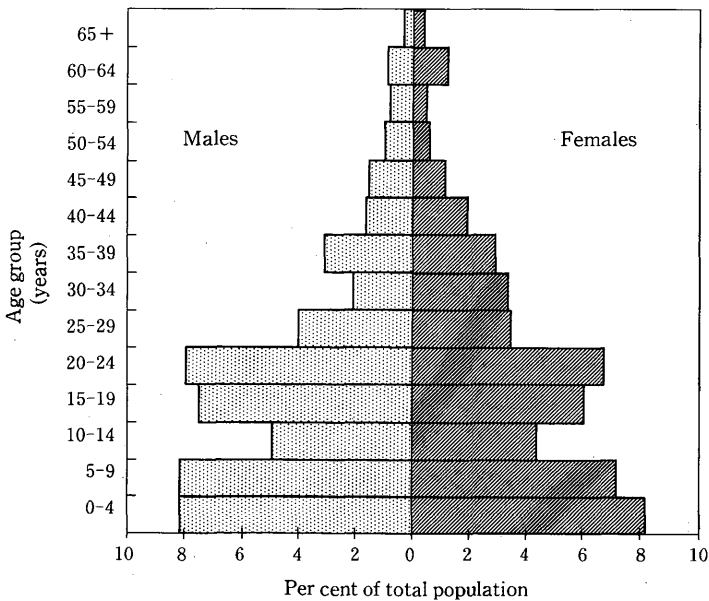


Figure 4-1 Population pyramid for Maningrida in 1991*
* Source: ABS 1998b

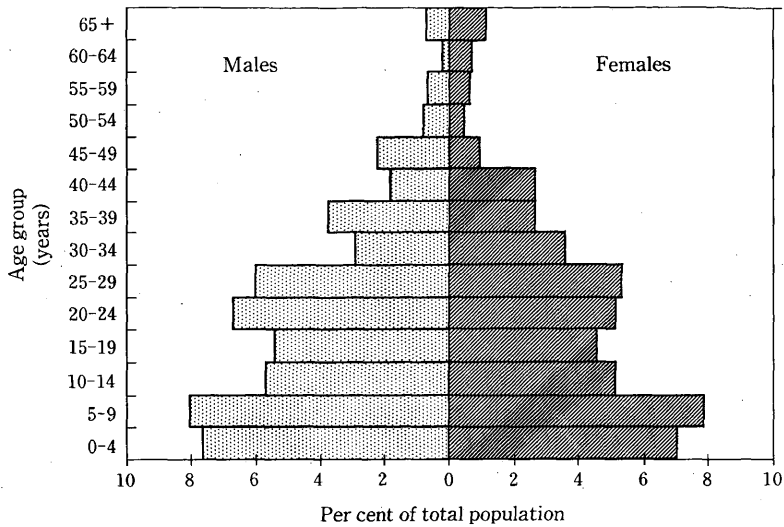


Figure 4-2 Population pyramid for Maningrida in 1996*
* Source: ABS 1998c

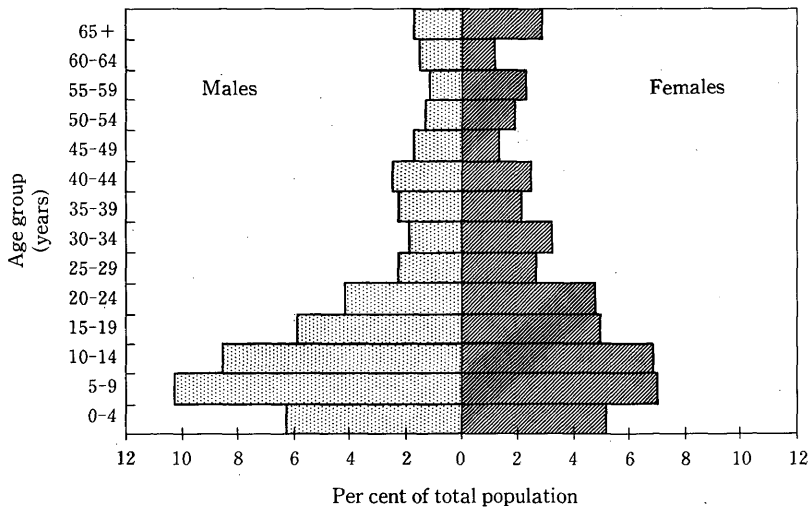


Figure 4-3 Population pyramid for Maningrida outstations in 1996*
* Source: ABS 1998c.

4.3 Estimation of population

Table 4-2 shows the estimated population of Maningrida for each year from 1986 to 1996. I used this estimated population data to calculate the annual food supply per capita used in the rest of this report (except for 1991

Table 4-2 Estimation of the annual population of Maningrida from 1986 to 1996

Year	Population of Maningrida	
	Census data*	Estimated**
1986	646	649
1987		717
1988		786
1989		854
1990		922
1991	997	991
1992		1059
1993		1127
1994		1196
1995		1264
1996	1329	1332

* Source: ABS 1998a; 1998b; 1998c.

** The estimated population = $68.3 \times \text{year}$
- 134, 995 (refer to the Methods section)

where I used the Census population because it is more accurate).

Food for people in outstations is ordered separately by the Maningrida store, so I did not consider the outstations population in my calculations of per capita food supply. Many non-Indigenous people (about 10% of the Maningrida population) order foods from Darwin, but also sometimes use the Maningrida store. Accordingly, I have included them in the estimated population of Maningrida.

5.0 STORE FOOD SUPPLY (NOT INCLUDING FRESH FRUIT AND VEGETABLES)

5.1 Introduction

Store orders were classified into five categories; 'grocery', 'frozen', 'chilled', 'meat', and 'fruit and vegetables'. Grocery orders included daily necessities like shampoo, washing powder, and tobacco. Fruit and vegetables were ordered separately. I will discuss fresh fruit and vegetables in the next section.

The frequency of grocery orders (including meat, frozen food, and chilled food) was 22, 24, 25, 24, 24, 26, 31 and 56 times per year from 1988 to 1995, respectively, reflecting the frequency of the barge from Darwin to Maningrida. The barge frequency changed from fortnightly to weekly from November 1994 onwards.

Figure 5-1 shows the number of individual items ordered by the store (excluding 'fruit and vegetables') over the period 1988-1995. The total number of items barged to Maningrida from 1988 to 1995 was 316, 316, 298, 365, 384, 428, 429 and 436. The frequency of orders has increased since 1994, and the variety of item has increased since 1991.

I have classified food into 12 groups, as shown in Table 5-1.

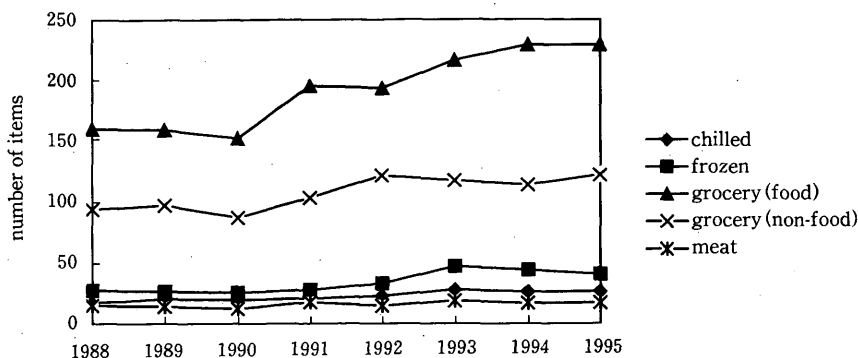


Figure 5-1 Maningrida store items ordered over the period 1988-1995*

* Source: MPA 1996.

Table 5-1 Maningrida store food groups

Food groups	Item
Beverages	liquid—soft drink, cordial, juice dry—tea, other drinks (coffee, milo, quick strawberry)
Canned food	vegetables, fish, fruits, meat & vegetables, spaghetti, corned beef, cooked beans, steak pie
Dairy products	liquid—Long Life milk, skim milk, cream, evaporated milk, milk portions solid—powdered milk, cheese, condensed milk
Eggs	fresh eggs
Frozen food	ice cream, dinners, cakes, vegetables
Grain products	flour, rice, breakfast cereals, pasta, cornflour, bread crumbs
Convenience food	dinners, noodles, cup noodles, soup
Meat	frozen meat, ham and sausages
Oils and fats	margarine, butter, oil
Seasoning	salt, tomato sauce, vinegar and other seasoning (sauce, dressings)
Sugars	sugar, honey, syrup
Other food	biscuits, sweets, baby food, jam and spread, dried fruits etc.

5.2 Change of store food orders

5.2.1 Beverages

Beverages are divided into two groups: liquid (soft drink, cordial and juice); and dry (tea, coffee, milo, and quick strawberry). Of the liquid beverages, soft drink comprised about 80%, cordial 10% and juice 10% of the

total over eight years, as shown in Figure 5-2. The annual supply of soft drink (except cola—Coca-Cola and Pepsi Cola) was almost constant, at between 35 kl and 50 kl. However, cola increased from 16 kl per year in 1988 to 60 kl per year in 1995. Cola increased from 25% of all soft drink in 1988 to 50% in 1995.

Figure 5-3 shows the supply of cordial to Maningrida from 1988 to 1995. It appears that the supply of cordial has increased since 1992. Kava was banned in 1998 in the Northern Territory, and since then kava use has declined in remote NT communities, while would-be kava users may drink undiluted cordial as a substitute (NT News 12th October 1998). Bottled water was not

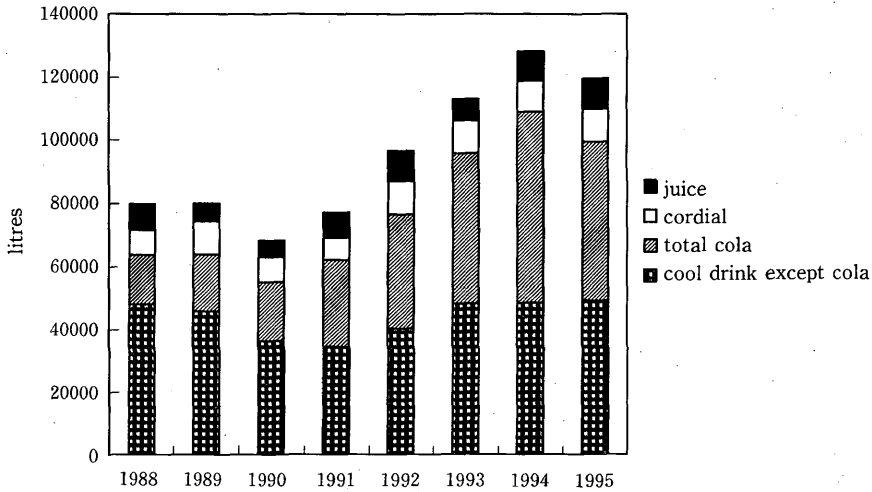


Figure 5-2 Annual Maningrida store orders for beverages from 1988-1995*
* Source: MPA 1996.

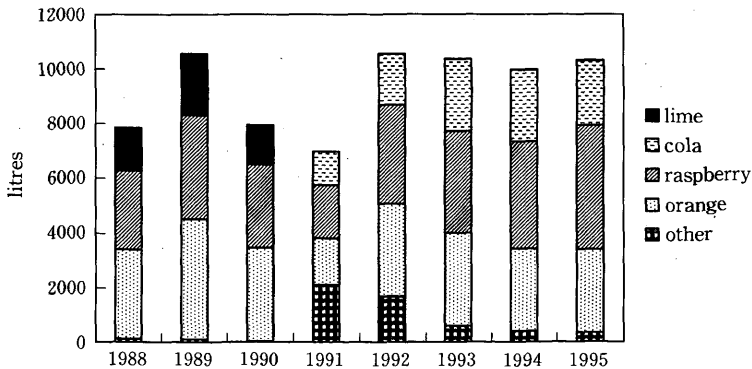


Figure 5-3 Annual Maningrida store orders for cordial from 1988-1995*
* Source: MPA 1996.

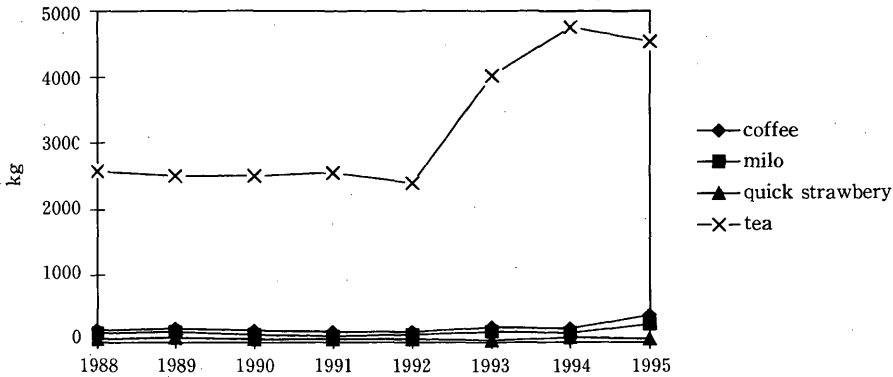


Figure 5-4 Annual Maningrida store orders for dry beverages from 1988-1995*
* Source: MPA 1996.

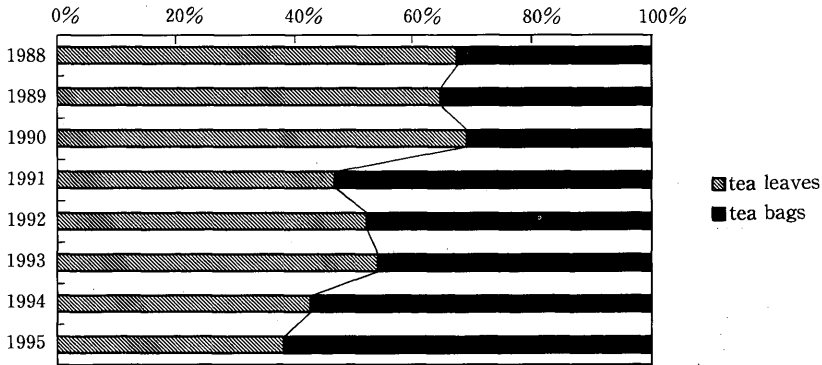


Figure 5-5 Annual Maningrida store orders for tea leaves and tea bags, expressed as a per cent of total tea orders, from 1988-1995*
* Source: MPA 1996.

sold from the Maningrida store before 1998. This is because the Maningrida water supply is of good quality, according to the store manager.

Tea was the most popular dry beverage ingredient over this period of time. The tea supply was constant from 1988 to 1992, then increased rapidly from 1993, (Figure 5-4). The supplies of coffee, milo and quick strawberry were small compared to that of tea, although they did increase somewhat in 1995 (Figure 5-4). There are two types of tea—leaves and tea bags. The proportion of total tea as tea bags steadily increased from 30% (1988 to 1990) to 50% (1991 to 1993), to 60% (in 1994, 1995), as shown in Figure 5-5.

5.2.2 Canned food

Figure 5-6 shows the supply of canned food to Maningrida for 1988 to

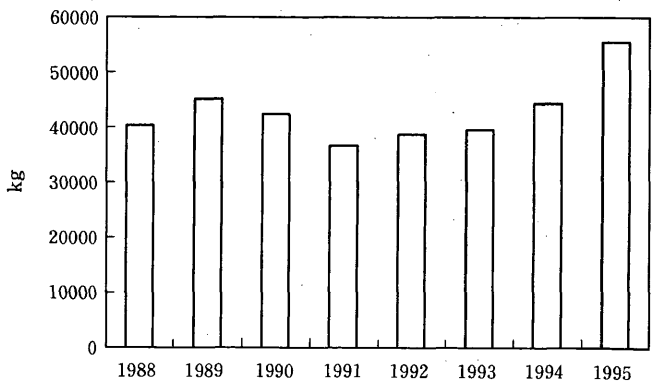


Figure 5-6 Annual Maningrida store orders for canned food from 1988-1995*
* Source: MPA 1996.

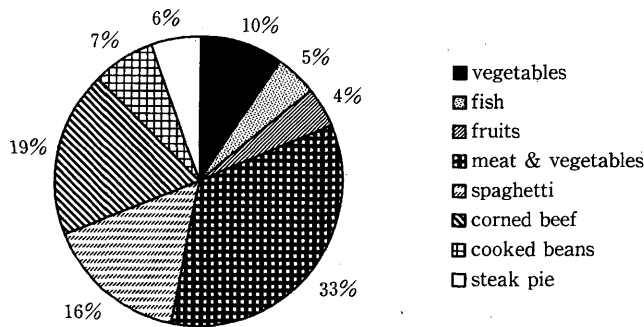


Figure 5-7 Relative proportions of the eight different canned food categories ordered by the Maningrida store, averaged from 1988-1995*
* Source: MPA 1996.

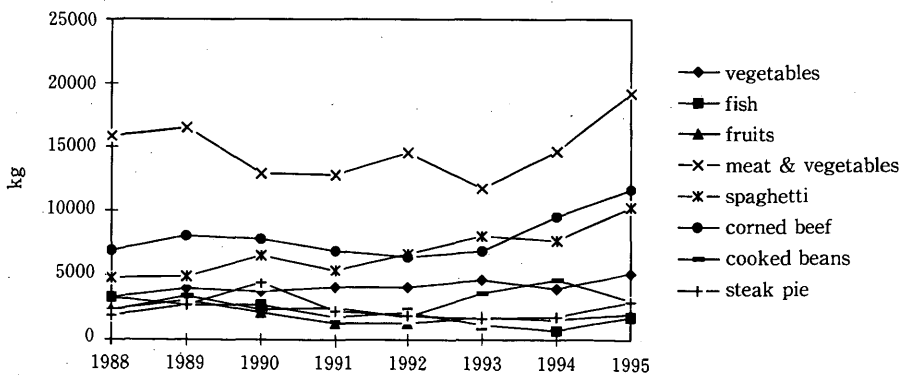


Figure 5-8 Annual Maningrida store orders for eight different canned food categories from 1988-1995*
* Source: MPA 1996.

1995.

I have classified canned food into the following eight categories: vegetables, fish, fruits, meat and vegetables, spaghetti, corned beef, cooked beans, and steak pie. Figure 5-7 shows the relative proportion of the different types of canned food, averaged over eight years.

Of the total canned food ordered by Maningrida store over this period, meat and vegetables (e.g. steak and onion stew) comprised 33%, corned beef 19 %, and spaghetti 16%. Figure 5-8 shows that the supply of corned beef, canned spaghetti and canned vegetables have tended to increase, while canned fish and fruits have decreased over this eight-year period.

5.2.3 Dairy products

There are two types of dairy products, liquid and solid. Figure 5-9 shows that milk (Long Life milk) comprised 90% of total liquid dairy products. Skim milk was only supplied from 1991, and quantities ordered since that time have increased.

Figure 5-10 shows that powdered milk made up over 90% of the solid dairy products over this period, with cheeses comprising a relatively small proportion. The total supply of solid dairy products has increased over this period.

5.2.4 Eggs

Figure 5-11 shows the supply of eggs to Maningrida over this period. The total supply of eggs was 6.3 tonnes in 1988, and this increased to 9.7 tonnes in 1995. The eggs were supplied in packages of 12 of size 50 gram eggs.

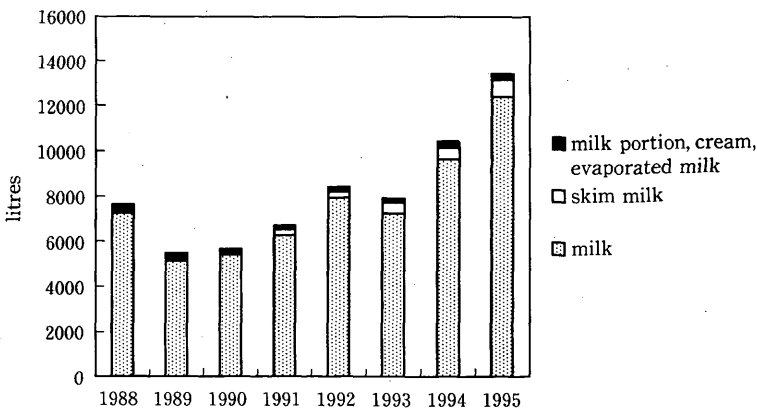


Figure 5-9 Annual Maningrida store orders for liquid dairy products from 1988-1995*

* Source: MPA 1996.

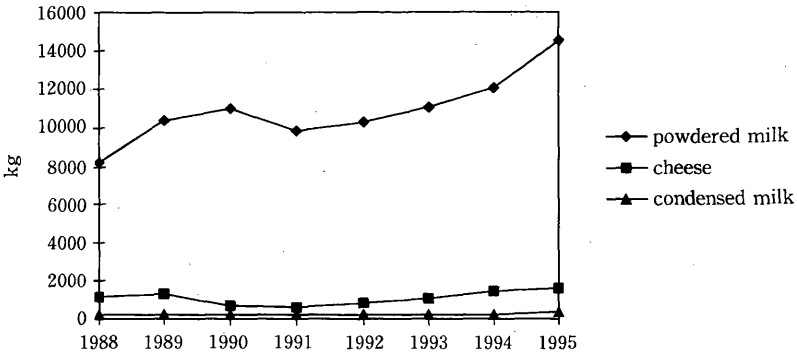


Figure 5-10 Annual Maningrida store orders for solid dairy products from 1988-1995*
* Source: MPA 1996.

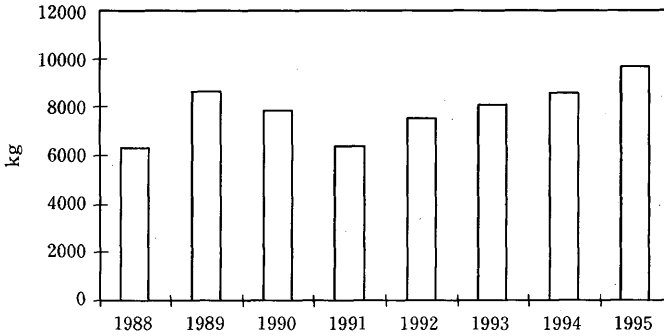


Figure 5-11 Annual Maningrida store orders for eggs from 1988-1995*
* Source: MPA 1996.

5.2.5 Frozen food

Frozen food was classified into the following four groups: ice cream; dinners; cake; and vegetables. The unit of ice cream is litres (i.e. volume).

Figure 5-12 shows the Maningrida store orders of total frozen foods (without ice cream) over this period, and Figure 5-13 shows the orders of ice cream over this period. The graphs show that the supply of frozen food has increased steadily since 1992, particularly for ice-cream in 1995.

The Maningrida store orders for frozen cake increased rapidly in 1994 and also in 1995. The variety of frozen foods in the store orders also increased over this period. In 1988, orders for frozen vegetables comprised only four kinds of food—peas, corn cobettes, mixed vegetables and baby carrots. However, in 1995 there were twelve kinds of frozen vegetables in the store orders, and the quantity ordered doubled between 1988 and 1995. Frozen corn cobettes and frozen chunk vegetable were the most popular item of frozen vegetables ordered over this period. Figure 5-14 shows the different flavours of ice-cream

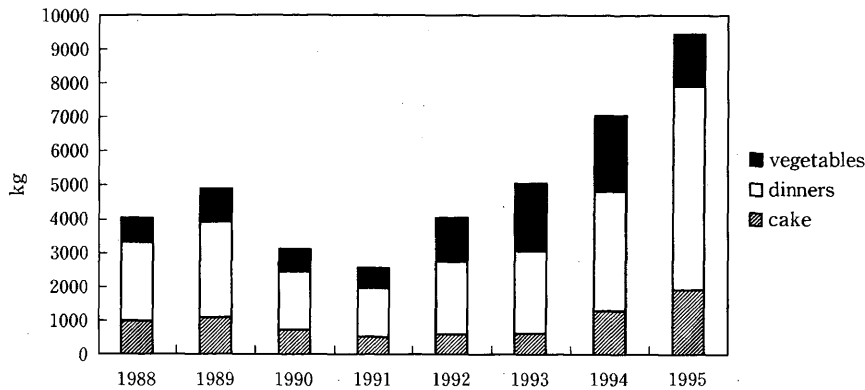


Figure 5-12 Annual Maningrida store orders for total frozen foods (excepting ice-cream) from 1988-1995*

* Source: MPA 1996.

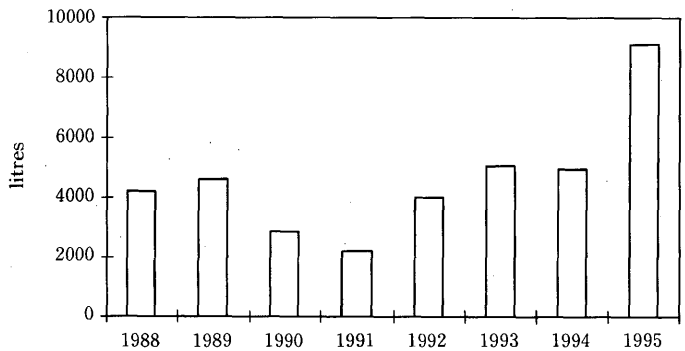


Figure 5-13 Annual Maningrida store orders for ice-cream from 1988-1995*

* Source: MPA 1996.

ordered over this period.

Vanilla flavour was the most popular, comprising about 68% of the total supply from 1988 to 1995. The size of ice-cream containers sold was two litres or five litres. Smaller volumes of ice cream are not sold in the Maningrida store.

The Maningrida store was renovated in 1994, and larger capacity refrigeration and freezer units were installed. This may help explain why the store orders of frozen food have increased since that time. Most Indigenous people in Maningrida do not have a refrigerator or freezer in their house, and consequently ice-cream is eaten immediately after purchase. In contrast, people living in outstations usually have a freezer for food storage.

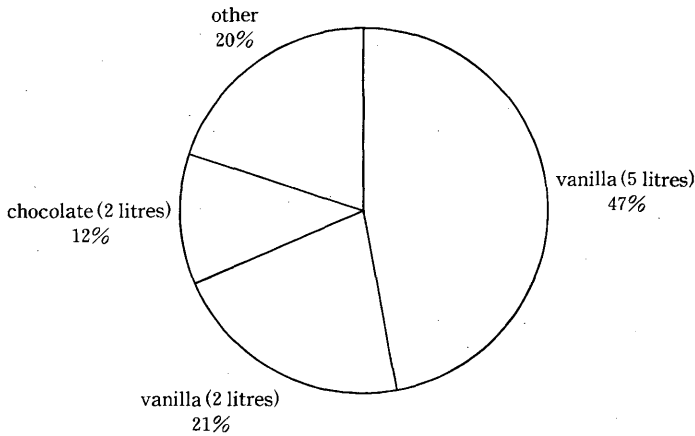


Figure 5-14 Maningrida store orders for different flavoured ice-cream as a per cent of all ice-cream orders from 1988-1995*

* Source: MPA 1996.

5.2.6 Grain products

Grain products include flour, rice, breakfast cereals and other items (e.g. pasta, cornflour and bread crumbs).

Figure 5-15 shows the Maningrida store orders for flour have fluctuated widely during the period 1988-1995. The amount of flour ordered in 1988 was 47.7 tonnes, and the amount ordered in 1995 was 63.9 tonnes. The supply of rice and breakfast cereals have averaged about ten tonnes each year during this eight-year period.

Aboriginal people use flour to make damper. The following five types of flour were ordered over this period: plain flour (1 kg bags); plain flour (16 kg tins); self-raising flour (1 kg bags); damper mix (16 kg tins); and whole wheat meal (1 kg bags).

Figure 5-16 shows that flour was ordered mainly as plain flour (93% of total) over this eight year period, with a small quantity of self-raising flour ordered (7% of total). Whole wheat meal flour was ordered in 1989, but ceased before long because Aboriginal people preferred the plain flour. Figure 5-16 also shows that plain flour was supplied mainly in 1 kg paper bags during this period. However, the supply of plain flour in 16 kg tins has increased since 1994. This coincides with the provision of a shuttle bus service by the Maningrida Progress Association in 1994, which provides the customer with an opportunity to buy larger portions of flour. The Maningrida bakery supplies bread to the store for sale. However, the flour for this bread is ordered separately from the store orders, and I could not determine the supply of bread to the store during this period.

Figure 5-15 shows that the store orders of rice have tended to increase over

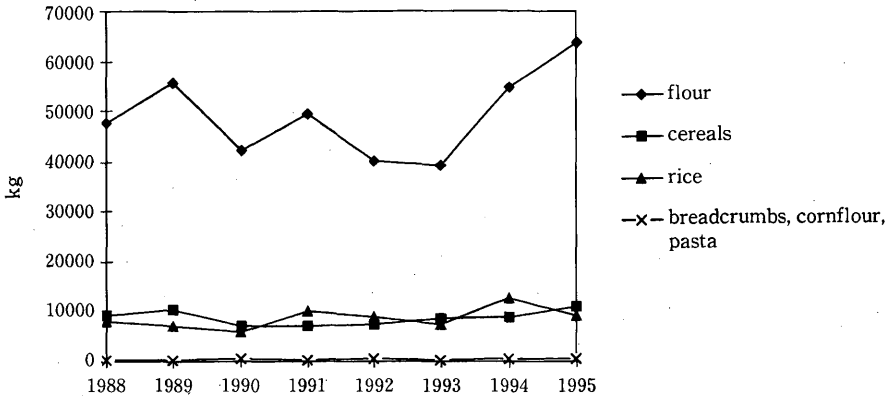


Figure 5-15 Annual Maningrida store orders for grain products from 1988-1995*
* Source: MPA 1996.

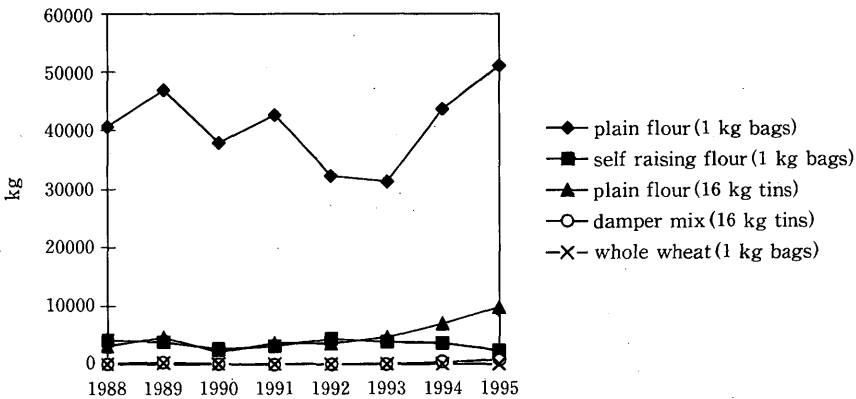


Figure 5-16 Annual Maningrida store orders for flour from 1988-1995*
* Source: MPA 1996.

this period. The type of rice ordered was long grain rice. Jasmine rice was ordered in 1994, but it was only a small proportion of total rice orders (1.6% in 1994 and 3.2 % in 1995).

5.2.7 Convenience food

Figure 5-17 shows the Maningrida store orders for convenience foods over this period.

Convenience foods include instant dinners, noodles, cup noodles and soup. Instant dinners consist of processed foods that contain ingredients such as rice or pasta, dried meat, dried vegetables and seasonings. The annual Maningrida store orders for dinner foods (pasta) fell from 2.4 tonnes in 1988 to 1.3 tonnes in 1990. Maningrida store orders for instant noodles, cup noo-

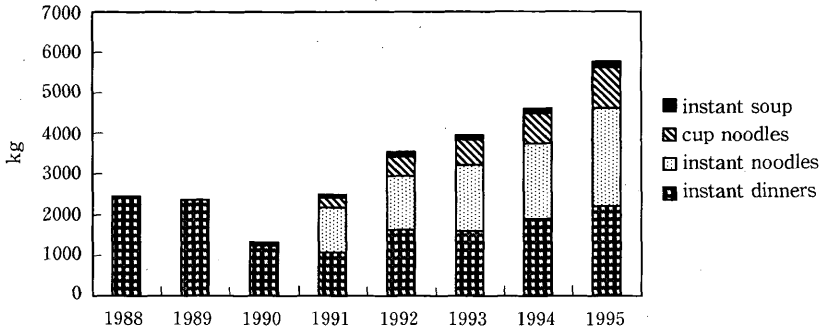


Figure 5-17 Annual Maningrida store orders for convenience foods from 1988-1995*
* Source: MPA 1996.

dles and cup soup commenced in 1991. These foods are easy to prepare by mixing the ingredients with hot or boiling water. Figure 5-17 shows that instant noodles were the most ordered convenience food, followed by cup noodles and instant soup. The total for store orders of convenience foods in 1995 was 5.7 tonnes.

5.2.8 Meat

Three kinds of meat were ordered by Maningrida store over this period: frozen meat; chilled ham and sausages; and canned meat (*refer to section 5.2.2*).

Figure 5-18 shows the store orders for these kinds of meat over this period.

Canned meat included corned beef, and mixed meat and vegetables. Frozen meat and canned meat form the largest portion of the meat supply. Canned meat orders were greater than those for frozen meat until 1992. Since 1993, store orders of frozen meat have been greater than that of canned meat. Frozen meat is usually ordered in 20 kg packs. These contain cut meat on a

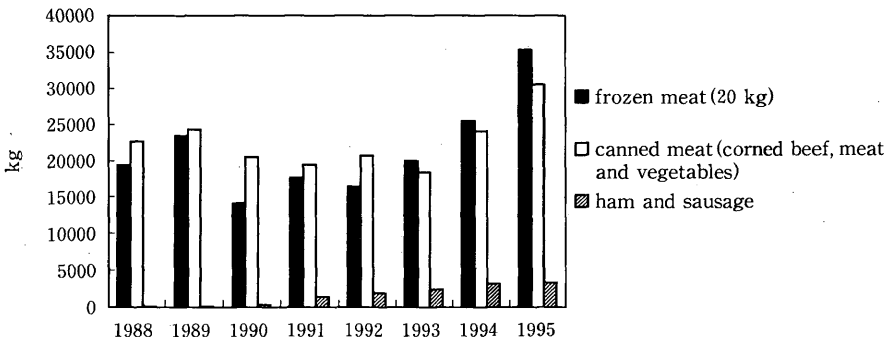


Figure 5-18 Annual Maningrida store orders for meat from 1988-1995*
* Source: MPA 1996.

tray covered in plastic with labelling information indicating the type of meat, weight and price. Beef is the most common meat ordered, comprising approximately 80% of orders over the eight year period, as shown in Figure 5-19. Store orders for frozen sausages have increased since they were first ordered in 1991.

Compared to beef, store orders for lamb, pork and chicken are small. Kangaroo tail was once ordered by the store in 1991. Quail bones were only ordered by the Maningrida store in 1994 and 1995. According to the manager of the Maningrida store, Aboriginal people prefer fresh kangaroo meat. Store orders for chilled ham and sausages have increased, especially since 1991. The total store orders for these meats was only 0.08 tonne (82 kg) in 1988, but by 1995 this had increased to 3.5 tonne.

5.2.9 Oils and fats

There are three types of oils and fats ordered by the Maningrida store during this period, margarine, butter, and oil, as shown in Figure 5-20.

Maningrida store ordered mainly margarine during this period.

5.2.10 Seasoning

Seasonings ordered by Maningrida store during this period included salt, tomato sauce, vinegar and other seasonings (e.g. sauce, dressings etc.). The pattern of store orders for salt and tomato sauce was almost identical during this period, as shown in Figure 5-21.

5.2.11 Sugars

Figure 5-22 shows the Maningrida store orders for sugar (2 kg bags and 4

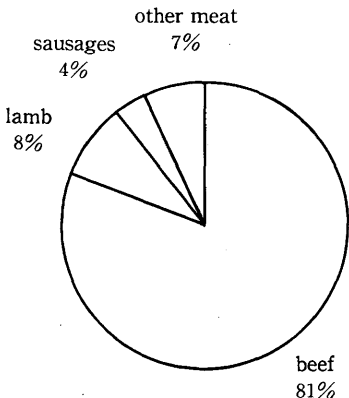


Figure 5-19 Maningrida store orders for different frozen meats as a per cent of all frozen meat orders from 1988-1995*
* Source: MPA 1996.

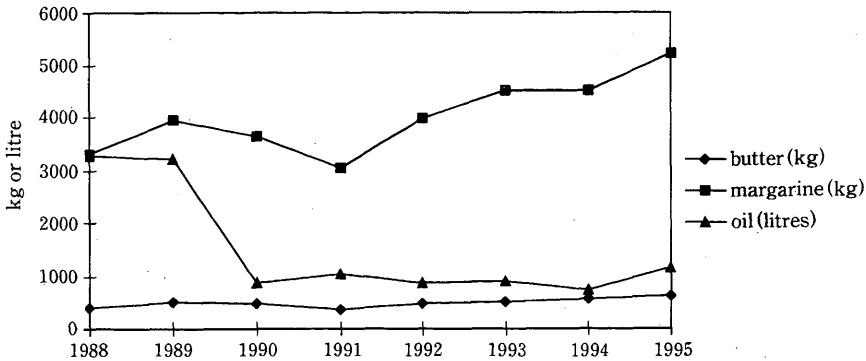


Figure 5-20 Annual Maningrida store orders for oils and fats from 1988-1995*
* Source: MPA 1996.

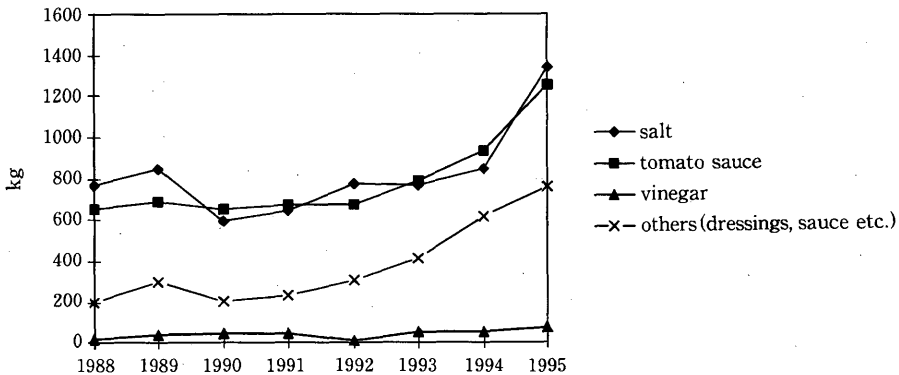


Figure 5-21 Annual Maningrida store orders for seasonings from 1988-1995*
* Source: MPA 1996.

kg tins) and 'other sugars' (honey, syrup etc.) during this period.

Annual Maningrida store orders for sugar decreased from 1988 to 1993, but subsequently increased. The total amount of sugar ordered in 1995 was 83 tonnes. Four kg tins of sugar were first ordered by Maningrida store in 1993, and orders have increased since that time. Tinned sugar is more easily preserved than bag sugar, and furthermore, tins can be used later as pots. Moreover, a shuttle bus service became available in 1994 making the transportation of these tins easier.

5.2.12 Other foods

Other foods include biscuits, sweets, baby food, jams and spreads, dried fruits, and pancake mix.

Figure 5-23 shows the annual Maningrida store orders for biscuits during

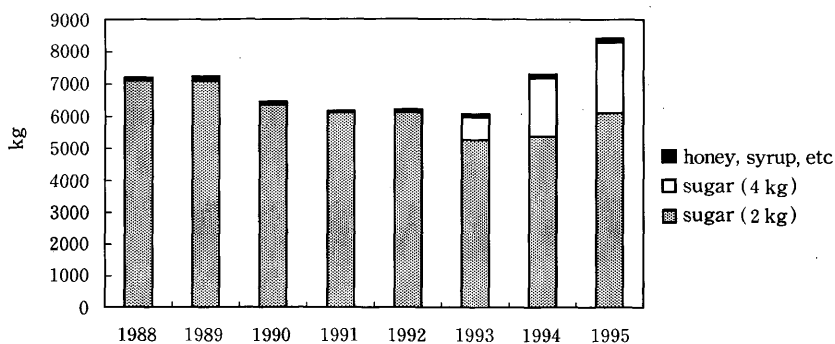


Figure 5-22 Annual Maningrida store orders for sugar and 'other sugars' from 1988-1995*
* Source: MPA 1996.

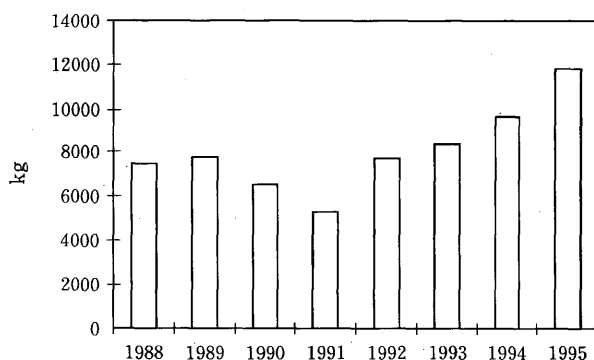


Figure 5-23 Annual Maningrida store orders for biscuits from 1988-1995*
* Source: MPA 1996.

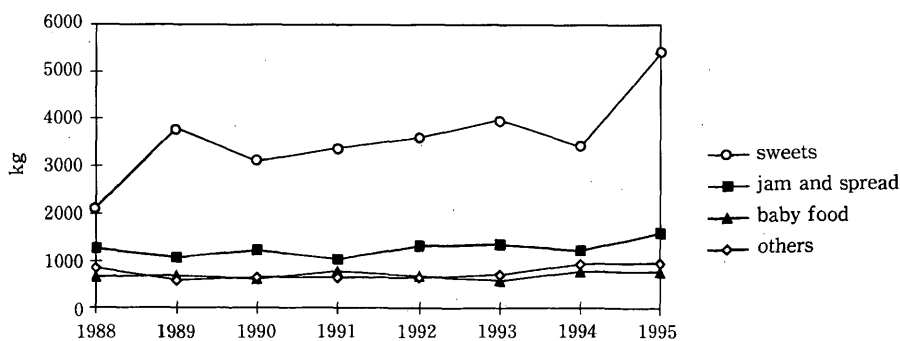


Figure 5-24 Annual Maningrida store orders for various foods from 1988-1995*
* Source: MPA 1996.

this period. The orders for biscuits fell in 1991, but subsequently increased.

Figure 5-24 shows store orders for sweets (creamed rice, custard, pudding, topping, and nougat), jams and spreads (jam, peanut butter, marmalade and vegemite), baby foods, and other foods during this period.

5.3 Summary

The frequency of Maningrida store food orders described in this section has increased since 1994, and the variety of items ordered has tended to increase since 1991. I classified these foods into 12 groups for this report—(1) beverages, (2) canned food, (3) dairy products, (4) eggs, (5) frozen food, (6) grain products, (7) convenience food, (8) meat, (9) oils and fats, (10) seasoning, (11) sugars, and (12) other foods (biscuits etc.). The main points include the following:

(1) soft drinks comprised about 80% of all liquid beverages ordered during the period 1988–1995. Cordial (10%) and juice (10%) made up the remainder;

(2) canned meat and vegetables comprised 33% of all canned food ordered during this period. Corned beef made up 19 % of orders. Orders for corned beef, canned spaghetti, and canned vegetables tended to increase, while orders for canned fish and fruits decreased during this period;

(3) store orders for Long Life milk and powdered milk were high during this period;

(4) store orders for eggs increased after 1991;

(5) store orders for frozen food increased after 1992;

(6) total store orders for flour increased from 47.7 tonnes in 1988 to 63.9 tonnes in 1995. Plain flour comprised 93% of all flour ordered during this period;

(7) store orders for instant food increased from 1991, at the time instant noodles were ordered for the first time;

(8) store orders for frozen meat have increased since 1993. More than three-quarters of the frozen meat ordered was beef;

(9) store orders for margarine formed the main part of all orders for fats and oils;

(10) store orders for seasoning have increased over this period;

(11) the supply of sugar gradually decreased until 1993, but since then it has increased again. The total amount of sugar supplied in 1995 was 83 tonnes; and

(12) store orders for biscuits increased since 1991.

6.0 FRUIT, VEGETABLES AND NUTS

6.1 Introduction

Fruit, vegetables, and nuts are ordered separately from dry goods by Maningrida store. The store order records I have are from June 1992 to 1995.

Fruit, vegetables and nuts are ordered and transported to Maningrida from Darwin both by barge and by air. Barges used to come fortnightly, but have been coming weekly since November 1994. Air supplies used to come once a week, but since the latter half of 1993 they have come bi-weekly.

These items are shown in Table 6-1. Typical fruits transported by barge are oranges, red apples, mixed fruit trays, and granny smith apples. Typical vegetables delivered by barge are potatoes, onions, and carrots. Typical fruits transported by air include rockmelons, bananas, strawberries, and grapes. Typical vegetables transported by air include tomatoes, lettuce, and capsicum (green and red).

6.2 Changes in orders of fruit, vegetables and nuts

Figure 6-1 shows the Maningrida store orders for fruit, vegetables and nuts over this period. The total amount of fruit ordered in 1993, 1994, and 1995 was 30.8 tonnes, 29.6 tonnes, and 29.3 tonnes, respectively.

The amount of fruit ordered by Maningrida store has decreased slightly over this period, while orders for vegetables have increased. The total amounts of vegetables ordered in 1993, 1994, and 1995 were 13.2 tonnes, 15.0 tonnes,

Table 6-1 Summary of fruit and vegetables transported to Maningrida by barge and air

Transportation	Fruit and vegetables
Fruit by barge	Apples—granny smith and red, fruit tray mixed, mandarines, oranges, pears, water melons
Fruit by air	Avocados, bananas, grape fruit, dark and green grapes, honey dew melons, kiwi fruit, lemons, mangoes, passion fruit, pineapples, rockmelons, strawberries
Vegetables by barge	Carrots, brown onion, potatoes, butternut pumpkin, soup pack
Vegetables by air	Alfalfa, asparagus, basil, bean shoots, bean green, broccoli, brussel spouts, button squash, cabbage, chinese cabbage, green and red capsicum, cauliflower, celery, cherry tomatoes, chilly red eye, choy sum, coriander, cucumber, dill, egg plant, gai lum, garlic, ginger, lettuce, mushrooms, pak choy, parsley, silverbeet, snow peas, spring onions, sweet potatoes, roma tomatoes, tomatoes, water cress, zucchini
Nuts by barge	Mixed nuts, peanuts

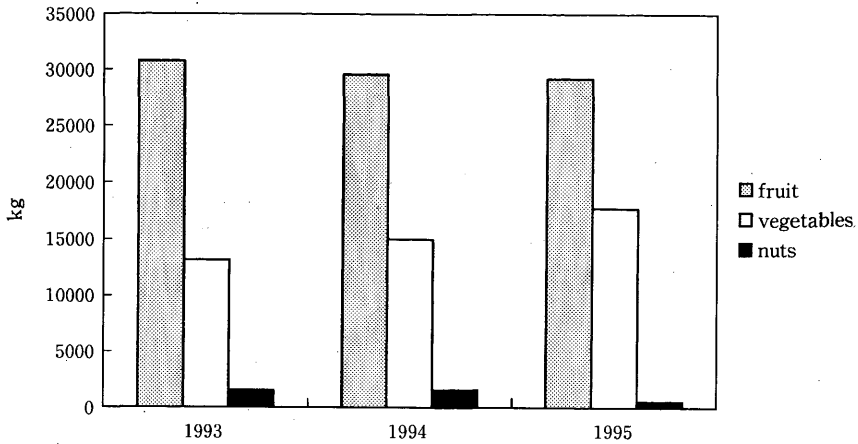


Figure 6-1 Annual Maningrida store orders for fruit, vegetables and nuts for the period 1993-1995*

* Source: MPA 1996.

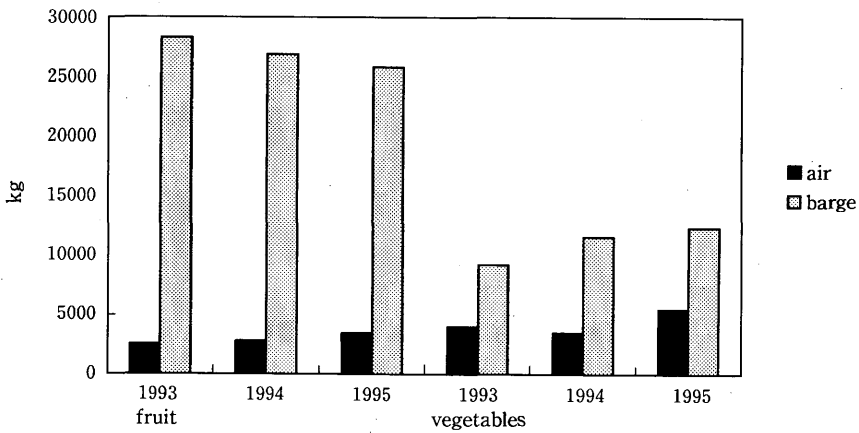


Figure 6-2 Annual Maningrida store orders for fruit and vegetables transported by barge and air over the period 1993-1995

and 17.8 tonnes respectively. Store orders for nuts are small, and decreased in 1995.

Figure 6-2 shows the Maningrida store orders for fruit and vegetables supplied by barge and by air over this period. It appears that store orders for fruit transported by barge have decreased, while store orders for fruit transported by air have increased. Store orders for vegetables transported by both barge and by air have increased.

Figure 6-3 shows the type of fruit ordered (on average) from 1993 to 1995. Oranges and apples were the main fruit ordered. Oranges and mandarines

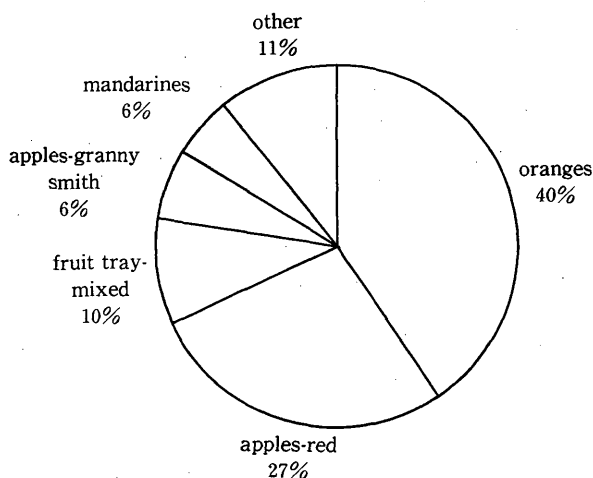


Figure 6-3 The proportion of different fruit that make up all fruit ordered by Maningrida store over the period 1993-1995*
 * Source: MPA 1996.

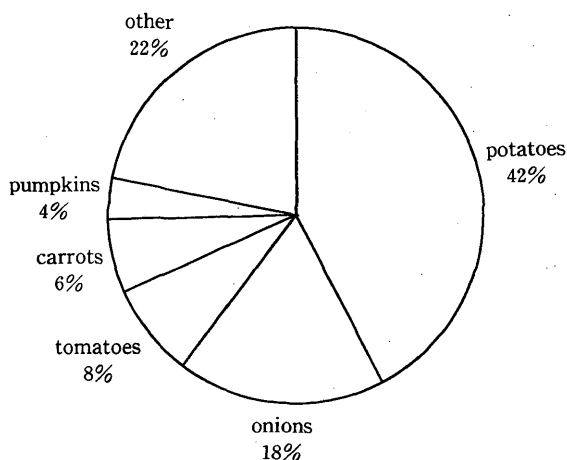


Figure 6-4 The proportion of different vegetables that made up all vegetables ordered by Maningrida store over the period 1993-1995*
 * Source: MPA 1996.

comprised nearly 50% of all fruit ordered, while red apples and granny smith apples comprised 39%.

Figure 6-4 shows the types of vegetables ordered (on average) by Maningrida store from 1993 to 1995.

Potatoes comprised 42% of all vegetables ordered, while onions (brown) comprised 18%. Tomatoes, carrots and butter nut pumpkins together com-

prised approximately 20% of all vegetables ordered.

Store orders for fruit and vegetables increased 1.5 times on average, between 1993 and 1995. Increased some commonly vegetables were: silver beet (2.6 times); bananas (2.5); sweet potatoes (2.2); potatoes (2.2); broccoli (1.8); brown onions (1.6); butter nut pumpkins (1.6); and zucchini (1.5).

Store orders for herbs such as basil (3.4), coriander (2.0), dill (2.1), and parsley (1.7) generally increased over this period. However, the amounts ordered were small.

6.3 Summary

Fruit, vegetables and nuts were ordered and transported both by barge and by air. The frequency of orders has increased between 1993 and 1995. The total amount of fruit ordered by the Maningrida store in 1993, 1994, and 1995 was 30.8 tonnes, 29.6 tonnes and 29.3 tonnes respectively, so total fruit orders have decreased slightly over this period. In contrast, over this same period of time, the supply of vegetables has increased.

Oranges and apples were the most common fruit ordered. Oranges, mandarines, and apples comprise 90% of all the fruit orders by Maningrida store over this period. Potatoes and brown onions comprise 60% of all vegetables ordered by Maningrida store over this period. Store orders for silverbeet, bananas, sweet potatoes, potatoes, basil, coriander, and dill increased rapidly in the three-year period between 1993 and 1995.

7.0 STORE FOOD ORDERS PER CAPITA PER DAY

7.1 Introduction

The amount of food ordered annually by Maningrida store changed over the eight year study period, as did the population, which increased. This section examines variations in the store food orders per capita, as described in the methods section.

7.2 Change of store food orders per capita per day

Figure 7-1 shows the beverages ordered per capita per day by Maningrida store over the study period. The orders of soft drinks decreased in 1990, rose steadily until 1994, and decreased in 1995. The average amount of soft drink ordered rose from 164 ml in 1990 to 250 ml in 1994.

Figure 7-2 shows the Maningrida store orders of canned food expressed as per capita per day.

Figure 7-3 shows fluctuations in per capita per day store orders of milk and powdered milk.

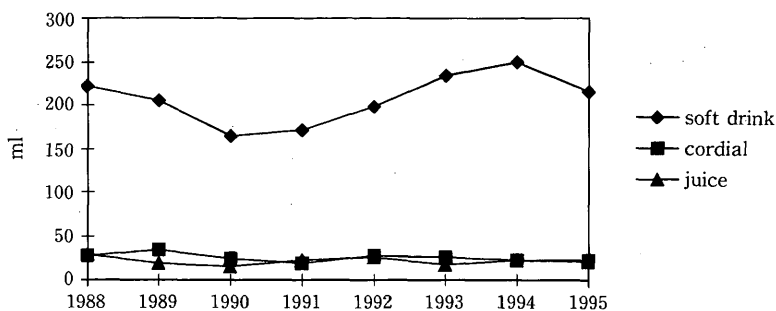


Figure 7-1 Maningrida store orders of beverages per capita per day over the period 1988–1995

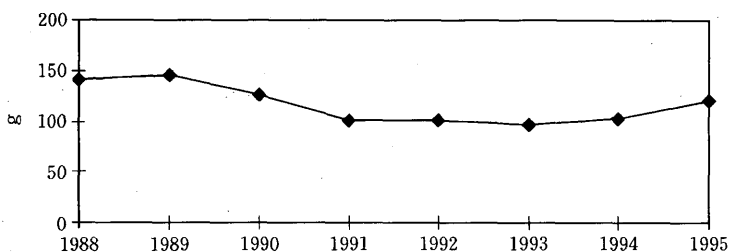


Figure 7-2 Maningrida store orders of canned food per capita per day over the period 1988–1995

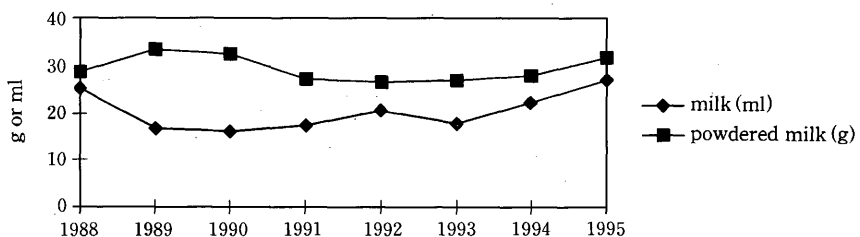


Figure 7-3 Maningrida store orders of dairy products per capita per day over the period 1988–1995

Figure 7-4 shows the per capita per day store orders of eggs. Orders for eggs increased to 28 g in 1989, declined to 17 g in 1991, and slowly increased to 21 g in 1995. The weight of an egg sold in Maningrida was 50 g over the study period, which suggests that on average one egg per person was consumed every two to three days.

Figure 7-5 shows the total frozen food orders (except for frozen meat) per capita per day. This declined from 1989 to 1991, and then increased to 1995. In 1995, the average amount of frozen food ordered per capita per day was 20

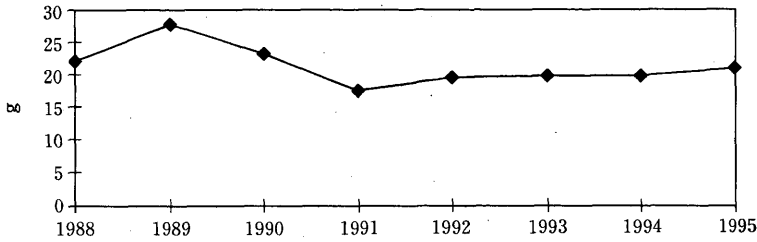


Figure 7-4 Maningrida store orders of eggs per capita per day over the period 1988-1995

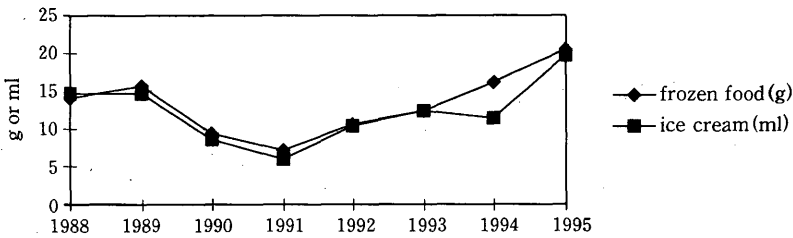


Figure 7-5 Maningrida store orders of frozen food per capita per day over the period 1988-1995

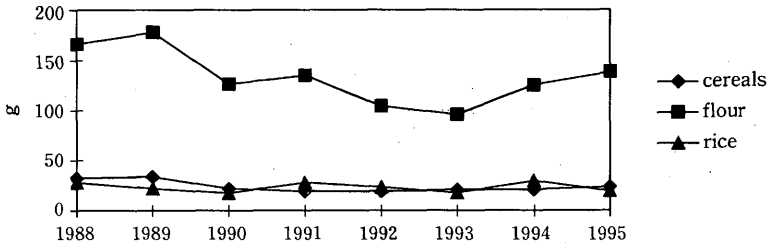


Figure 7-6 Maningrida store orders of grain products per capita per day over the period 1988-1995

g.

Figure 7-6 shows store orders of grain products per capita per day. Orders of flour declined from 1989 to 1993, but increased to 1995. The orders per capita per day were 166 g in 1988, and 138 g in 1995.

Figure 7-7 shows store orders of total instant food per capita per day. This declined to a low of 4 g in 1990, and then increased steadily to 13 g by 1995.

Figure 7-8 shows store orders of meat per capita per day. The total amount ordered declined from 1988 to 1993, but increased to 151 g by 1995.

Figure 7-9 shows store orders of oils and fats per capita per day. Orders

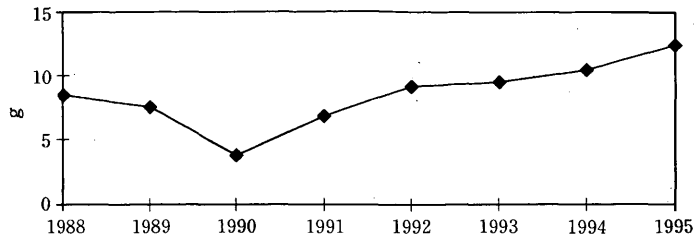


Figure 7-7 Maningrida store orders of convenience foods per capita per day over the period 1988-1995

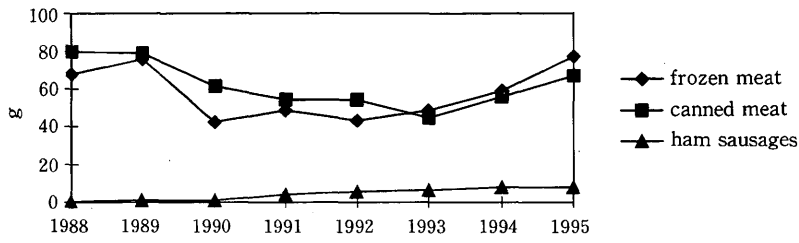


Figure 7-8 Maningrida store orders of meat per capita per day over the period 1988-1995

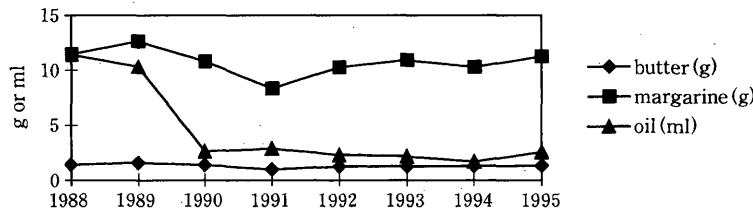


Figure 7-9 Maningrida store orders of oils and fats per capita per day over the period 1988-1995

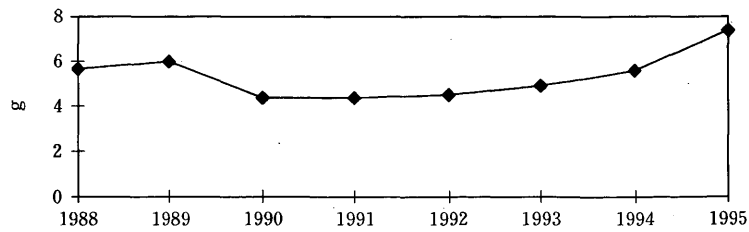


Figure 7-10 Maningrida store orders of seasonings per capita per day over the period 1988-1995

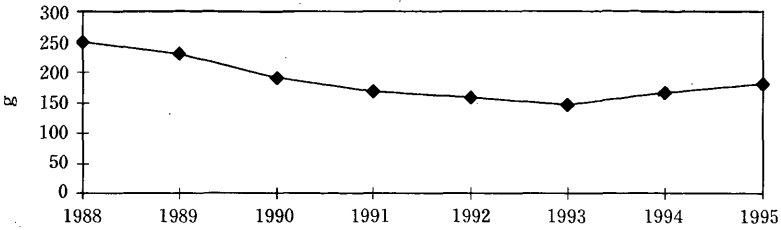


Figure 7-11 Maningrida store orders of sugar per capita per day over the period 1988-1995

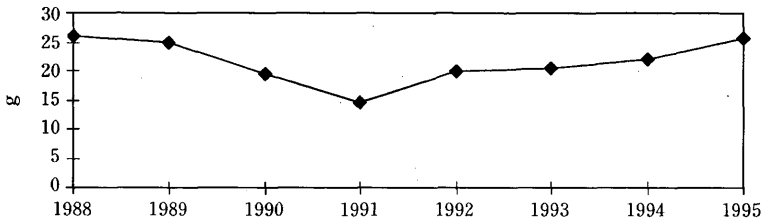


Figure 7-12 Maningrida store orders of biscuits per capita per day over the period 1988-1995

Table 7-1 Maningrida store orders for fruit and vegetables over the period 1988-1995, expressed as per capita per day (g)

	1988	1989	1990	1991	1992	1993	1994	1995
Fruit								
Fresh	n/a	n/a	n/a	n/a	n/a	75	68	63
Canned	8	10	6	4	3	4	4	4
Dried	1	1	1	1	1	1	1	1
Jam	3	2	3	2	3	2	2	2
Juice (ml)	29	18	15	22	25	17	21	21
Vegetables								
Fresh	n/a	n/a	n/a	n/a	n/a	32	34	39
Canned	11	13	11	11	11	11	9	11
Frozen	3	3	2	2	3	5	5	3

of margarine fluctuated around 10g over the study period. Orders of oil dropped markedly from 11 ml in 1988 to 3 ml in 1990, and remained at this level until 1995.

Figure 7-10 shows store orders of seasonings per capita per day. These varied between 4-7 g over the study period.

Figure 7-11 shows store orders of sugar per capita per day. Orders declined steadily from 248 g in 1988 to 145 g in 1993. Orders increased to 180

g by 1995.

Figure 7-12 shows store orders of biscuits per capita per day. This declined steadily from 1988 to 1991, but subsequently increased to 26 g in 1995.

Table 7-1 shows fruit and vegetables orders per capita per day. Orders of fresh fruit declined from 75 g in 1993 to 63 g in 1995. Canned fruit, dried fruit, and jams were ordered in small amounts only. Orders of fresh vegetables increased from 32 g in 1993 to 39 g in 1995. Orders of canned vegetables remained at 11 g for most of the study period from 1988 to 1995.

7.3 Summary

I have examined variations in Maningrida store food orders expressed as quantity per capita per day over the study period. Most food orders showed a pattern of decline and subsequent increase. There were three major trends:

- 1) A dip in 1991e.g. frozen food, biscuits, eggs.
- 2) An increase after 1992.....e.g. soft drinks, most foods.
- 3) A further increase after 1994e.g. flour, sugar, canned food.

8.0 COMPARISON WITH OTHER DATA

8.1 Introduction

For comparison, I have used 'apparent dietary intake in remote Aboriginal communities' (Lee *et al.* 1994a) and apparent per capita consumption in Australia (ABS 1998d).

Lee and colleagues studied apparent per capita food and nutrient intake in six remote Australian Aboriginal communities using the 'store-turnover' method (Lee *et al.* 1994a). The 'store-turnover' method is based on the analysis of community store food invoices. Under the unique circumstances of remote Aboriginal communities, the turnover of foodstuffs from the community store is a useful measure of apparent dietary intake for the community as a whole.

The ABS defines per capita apparent consumption as total apparent consumption divided by the mean population for the period (ABS 1998d). In apparent consumption data, 'consumption' is not 'intake'.

I modified the categories because different categories were employed.

8.2 Comparison with other remote Aboriginal communities

Table 8-1 shows apparent foodstuff consumption data from six remote Aboriginal communities and store orders data from Maningrida.

Lee and colleagues studied three central desert and three northern coastal communities. There were broad similarities between these communities in the intakes of sugar, vegetables, and flour and bread combined. However, the

Table 8-1 Comparison of Maningrida store orders with apparent consumption of selected foodstuffs in six remote Aboriginal communities (*expressed as g or ml per capita per day*)

Food	Maningrida		Remote Aboriginal communities*					
	1988	1995	C1	C2	C3	N1	N2	N3
Flour-white	166	138	125	115	69	158	116	91
Bread-whole meal ^a	0	0	0	12	13	15	7	20
Bread-white ^a	0	0	75	73	107	55	70	84
Beef	50	63	91	189	135	65	91	56
Poultry	9	1	61	56	66	25	76	61
Lamb	6	6	129	0	58	27	0	0
Fish	11	4	0	0	0	0	20	20
Fruit	n/a	63	78	49	146	55	43	47
Vegetables	n/a	39	79	40	81	48	73	40
Sugar	248	180	192	112	141	169	90	153
Carbonated beverages ^b	386	350	326	148	84	400	370	1071
Fruit juice	29	21	174	136	87	37	20	43
Tinned meat	79	67	10	40	27	34	40	9
Pies or pasties ^c	6	6	17	22	40	26	55	43
Snack foods	0	0	3	7	5	2	4	16

* Source: Lee *et al.* 1994a. C1, C2, and C3 are central Australian communities. N1, N2, and N3 are northern coastal communities.

^a Bread sold in Maningrida store came from the bakery in Maningrida.

^b Cordial diluted with water in Maningrida.

^c Canned pie in Maningrida.

desert communities appeared to consume greater quantities of store-purchased meat than the northern communities. Consumption of carbonated beverages was higher in the northern communities, but fruit and fruit juice appeared to be more popular in the centre (Lee *et al.* 1994a).

The store food orders data in Maningrida was similar to the consumption data published by Lee and colleagues for their six communities. However, Maningrida store appeared to order more flour, sugar, and canned meat, but less vegetables and frozen meat (including beef, poultry and lamb). I was unable to compare information relating to the supply of fresh bread because Maningrida data was unavailable. Moreover, pies, pasties, and snack foods were not sold in the Maningrida store, so direct comparisons were not possible.

8.3 Comparison with apparent per capita consumption in Australia

Table 8-2 compares Maningrida store food orders with ABS apparent per capita consumption data for 1995-1996.

The total amount of meat and meat products ordered by Maningrida store

in 1995 was small compared with the national apparent consumption data. The amount of seafood ordered by Maningrida store is comparatively small because locals can obtain fresh fish from the river or the sea.

With regard to dairy products, Maningrida store orders of market milk are comparatively small, while that of powdered milk is relatively high. Because Maningrida is a remote community, preserved foods such as Long Life milk and powdered milk are popular.

Compared with the national apparent consumption of fruit and fruit products, a relatively small amount of fruit and fruit products was ordered through the store in Maningrida. In 1995, the total amount of fresh fruit ordered by Maningrida store was 23.2 kg per person, while the apparent national per capita consumption rate was 100.9 kg for 1995–96, an amount nearly five times greater. The vegetable orders by Maningrida store were comparatively small, in 1995 it was 14.1 kg per person compared with 162.8 kg per person nationally in 1995–96.

Per capita orders of flour in Maningrida in 1995 was 50.5 kg compared with a national apparent per capita consumption of 77.5 kg in 1995–1996. The level of egg orders per capita in Maningrida was almost identical to the national apparent per capita consumption of this food for this period.

The total amount of sugar ordered per capita in Maningrida in 1995 was 66.6 kg, while the apparent national per capita consumption in 1995–96 was 46.6 kg, approximately one-third less.

The level of apparent per capita national consumption of aerated and carbonated waters (soft drinks) in 1995–96 was almost identical to the level of per capita orders of such drinks in Maningrida. However, the national apparent per capita consumption of coffee was greater than Maningrida's per capita orders, and the national apparent per capita consumption of tea was significantly less than the amount ordered per capita in Maningrida.

The per capita orders of nuts in Maningrida in 1995 was significantly less than the national apparent per capita consumption in 1995–96. Interestingly, the per capita orders of oils and fats in Maningrida in 1995 (5.5 kg) was approximately one-quarter of the apparent national per capita consumption in 1995–96 (19.2 kg).

Compared with the apparent national consumption data for 1995–96, the orders of sugar, powdered milk and tea in Maningrida in 1995 were relatively high, whereas those for soft drink, rice and eggs were almost identical. The per capita orders of fruit, vegetables and fish in Maningrida in 1995 were much lower than the national per capita consumption levels of these foods in 1995–96.

8.4 Summary

Overall, the apparent per capita consumption in Maningrida was similar to

Table 8-2 Comparison of Maningrida store orders with apparent per capita per year consumption in Australia

	Maningrida								Australia (ABS) ^a
	1988	1989	1990	1991	1992	1993	1994	1995	1995-1996
Meat and meat products									
Carcass meat									
Beef and veal (kg)	18.2	23.3	13.4	14.6	13.1	14.8	16.0	23.1	36.7
Lamb (kg)	2.2	2.3	1.1	1.6	1.5	1.6	2.0	2.1	11.3
Mutton (kg)									5.7
Pigmeat (kg) ^b	1.1	1.0	0.6	0.9	0.8	1.2	2.9	2.4	18.1
Total (kg)	21.5	26.6	15.1	17.1	15.4	17.6	20.9	27.5	71.7
Canned meat (canned weight) (kg) ^c	28.9	28.7	22.4	29.7	19.7	16.5	20.3	24.3	n/a ^d
Bacon and ham (cured carcass weight) (kg)	0.1	0.2	0.4	1.5	1.9	2.2	2.7	2.7	7.8
Poultry									
Poultry ^e	3.3	1.1	0.4	0.4	0.3	0.3	0.6	0.5	28.3
Seafood									
Total (kg) ^f	4.2	3.2	2.9	1.7	2.0	1.0	0.5	1.4	10.2
Dairy products									
Market milk (L)	9.2	6.0	5.9	6.3	7.5	6.4	8.1	9.8	104.2
Condensed, concentrated and evaporated milk (kg)	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3	1.1
Skim (kg) (L) ^g	0.0	0.0	0.0	0.2	0.3	0.4	0.4	0.6	0.4
Powdered milk (kg)	10.4	12.2	11.9	9.9	9.7	9.8	10.1	11.5	3.3
Cheese (natural equivalent weight) (kg) ^h	1.5	1.5	0.8	0.6	0.8	0.9	1.2	1.3	10.6
Fruit and fruit products									
Fresh fruit (incl. fruit for fruit juice)									
Citrus (kg)	n/a	n/a	n/a	n/a	n/a	14.4	12.6	11.1	45.5
Other (kg)	n/a	n/a	n/a	n/a	n/a	12.9	12.2	12.1	55.4
Jams, conserves, etc. (product weight) (kg)	1.1	0.8	1.0	0.8	0.9	1.0	0.9	1.0	2.0
Dried fruit (product weight) (kg)	0.5	0.5	0.4	0.4	0.3	0.4	0.4	0.4	2.7
Processed fruit (product weight) (kg) ⁱ	3.0	3.5	2.3	1.3	1.2	1.6	1.3	1.5	6.4
Total (fresh fruit equivalent) (kg)									
Vegetables									
Potatoes (kg)	n/a	n/a	n/a	n/a	n/a	5.0	5.8	5.4	70.1
Other root and bulb vegetables (kg)	n/a	n/a	n/a	n/a	n/a	2.9	3.5	4.1	24.3
Tomatoes (kg)	n/a	n/a	n/a	n/a	n/a	1.3	1.0	1.5	20.6
Leafy and green vegetables (kg)	n/a	n/a	n/a	n/a	n/a	0.7	0.6	0.9	21.5

Goto Store Food

Other vegetables (kg)	n/a	n/a	n/a	n/a	n/a	1.7	1.6	2.2	26.3
Total (fresh equivalent weight) (kg)	n/a	n/a	n/a	n/a	n/a	11.7	12.6	14.1	162.8
Frozen vegetables (kg)	0.9	1.1	0.7	0.6	1.2	1.8	1.9	1.2	n/a
Canned vegetables (kg)	4.1	4.6	4.0	4.0	3.8	4.2	3.3	4.0	n/a
Grain products									
Flour (kg)	60.7	65.2	46.0	49.5	38.0	34.9	45.7	50.5	77.5
Breakfast foods (kg)	11.9	12.3	7.9	7.1	7.0	7.6	7.4	8.8	9.1
Table rice (kg)	10.3	8.3	6.5	10.1	8.3	6.7	10.7	7.2	6.5
Total	83.1	86.2	60.9	67.1	53.9	49.7	64.3	67.0	93.1
Bread ⁱ	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.4
Eggs and egg products									
Equivalent number of eggs (no.) ^k	160	202	170	127	143	144	144	153	132
Nuts (in shell)									
Peanuts (kg)	n/a	n/a	n/a	n/a	n/a	0.5	0.8	0.2	2.1
Tree nuts (kg)	n/a	n/a	n/a	n/a	n/a	0.9	0.5	0.3	4.5
Oils and fats									
Butter (kg)	0.5	0.6	0.5	0.4	0.5	0.5	0.5	0.5	2.9
Margarine (kg)	4.2	4.6	3.9	3.0	3.8	4.0	3.8	4.1	5.4
Total (fat content) (kg)	8.9	8.9	5.4	4.4	5.0	5.2	4.8	5.5	19.2
Sugars									
Cane sugar									
As refined sugar (kg)	90.4	83.4	69.0	61.5	57.9	53.0	60.5	65.7	8.6
In manufactured foods (kg)									32.3
Total (kg)	91.7	84.6	70.1	62.1	58.6	53.8	61.1	66.6	46.6
Beverages									
Tea (kg)	3.3	2.9	2.7	2.6	2.3	3.6	4.0	3.6	0.9
Coffee (kg)	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.3	2.2
Aerated and carbonated waters (L) ^l	131.0	136.6	103.0	97.3	122.2	131.1	132.8	119.5	114.6

^a Source: ABS 1998d.

^b Included pork and sausages.

^c Canned meat & vegetables and corned beef in Maningrida.

^d n/a=not available.

^e Chicken and quail in Maningrida.

^f Canned fish in Maningrida.

^g Maningrida (L), ABS (kg)

^h Net weight in Maningrida.

ⁱ Canned fruit in Maningrida.

^j There is no store order of bread. Bread was supplied by the bakery in Maningrida.

^k One egg is 50 g in Maningrida.

^l Includes bulk pre-mix and post-mix concentrates in terms of drink. Cordial diluted with five volumes water.

that reported by Lee and colleagues for six remote Aboriginal communities. However, the Maningrida store appeared to provide more flour, sugar, and canned meat, and less frozen meat and vegetables.

Compared with apparent consumption data in Australia nationally (ABS

1998d), Maningrida's apparent consumption of sugar, powdered milk and tea was much higher. However, consumption of fish, fruit, and vegetables were much lower in Maningrida than consumption in the wider Australian community.

9.0 TOBACCO

9.1 Introduction

Cigarette smoking is an important risk factor for a variety of diseases and conditions, including circulatory disease, respiratory disease, cancer and low birth weight. In Australia in 1994-95, 28% of males and 22% of females aged 15 and over were current smokers (AIHW 1996).

There is growing evidence that smoking is more common among Indigenous people than among non-Indigenous people in Australia. In 1994, an estimated 56% of Indigenous males and 48% of Indigenous females aged 15 years and over were current smokers (Cunningham 1997).

In the Jabiru Region in 1994, 61.4% of people aged thirteen years and over reported that they smoked cigarettes (ABS 1996). The Jabiru Aboriginal and Torres Strait Islander Commission (ATSIC) region of the Northern Territory includes Maningrida.

The methods I used to estimate the supply of cigarettes and loose tobacco was as follows:

- I counted the total number of packets of each brand of cigarette supplied by year;
- I calculated the total number of individual cigarettes;
- In relation to loose tobacco, I converted units (tins) into grams; and
- I estimated the smoking population (*refer to section 2*)

Tobacco was ordered at the same time as the groceries. The store is not the only place where people can buy tobacco. Other sources include the take-away shop, the outstations' tucker run, neighbouring communities, and Darwin.

9.2 Orders of cigarettes and loose tobacco

At Maningrida store, five kinds of cigarette were ordered in 1988. These were Benson & Hedges Special Filter cigarettes, Benson & Hedges Extra Mild, Peter Jackson, Winfield Red, and Winfield Blue. Benson & Hedges Special Filter were ordered until 1990, Benson & Hedges Extra Mild until 1991, and Holiday Super Mild were only ordered in 1992. Winfield Super Mild was first ordered in 1992. As a result, Peter Jackson, Winfield Red, Winfield Blue Extra Mild, and Winfield Super Mild have been ordered from 1993 to 1995.

Figure 9-1 shows the store orders of cigarettes.

Figure 9-2 shows Winfield Red was the most popular cigarette, comprising on average, 87% of sales over the eight-year study period. Winfield Blue comprised 8% of sales. According to information on Winfield Red packages, each cigarette contains, 16 mg or less of tar and 1.2 mg or less of nicotine, while Winfield Blue contains 12 mg and 1.2 mg each.

Figure 9-3 shows the annual supply of loose tobacco. The supply in 1994 is almost at the same level as 1990 and 1991, and represents a decline from 1993.

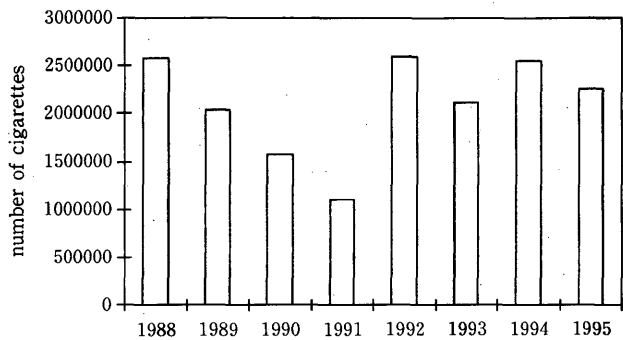


Figure 9-1 Annual Maningrida store orders for cigarettes from 1988-1995

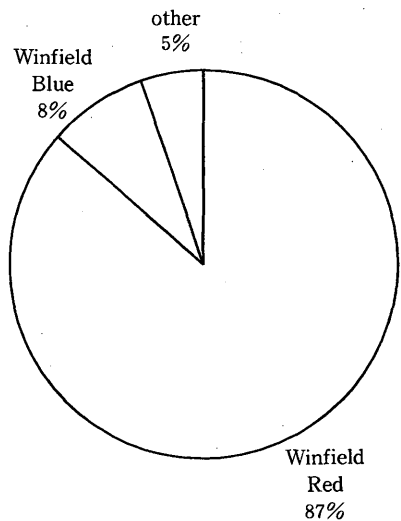


Figure 9-2 The proportion of different brands that make up all cigarettes ordered by Maningrida store over the period 1988-1995*

* Source: MPA 1996.

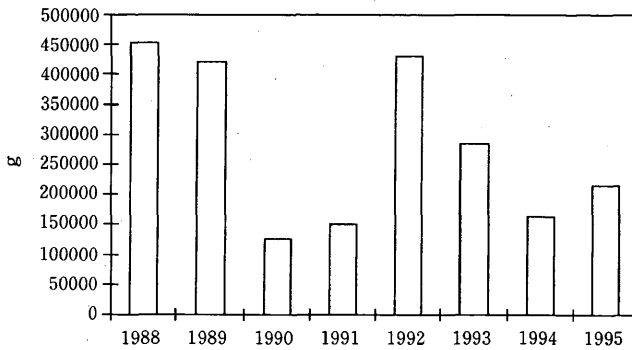


Figure 9-3 Annual Maningrida store orders for loose tobacco from 1988–1995 (total g)*

* Source: MPA 1996.

9.3 Orders of cigarettes and loose tobacco per estimated smoker per day

Orders per estimated smoker were calculated by dividing annual cigarette orders by the estimated smokers (Table 9-1).

The cigarette orders per estimated smoker per day was 24.9 cigarettes in 1988 and 13.4 cigarettes in 1995, representing a significant fall. The orders of loose tobacco show a similar fall over time, from 4.4 g per estimated smoker in 1988 to 1.3 g per estimated smoker in 1995.

The relatively high tobacco orders per estimated smoker in 1988 and 1992 can be explained by a greater amount of ceremony in those years. When ceremonies are held, the demand for cigarettes and loose tobacco is increased.

Table 9-1 Maningrida store orders for cigarettes and loose tobacco per estimated smoker per day from 1988–1995*

Year	1988	1989	1990	1991	1992	1993	1994	1995
Estimated population	786	854	922	997*	1059	1127	1196	1264
Estimated smokers**	285	310	335	362	384	409	434	459
Total cigarettes	2586500	2038750	1566000	1104500	2602000	2112000	2550200	2248240
Per estimated smoker per year	9075.6	6577	4675	3051	6776	5164	5876	4898
Per estimated smoker per day	24.9	18.0	12.8	8.4	18.6	14.2	16.1	13.4
Total loose tobacco (g)	454000	421750	126000	152000	429500	285500	163500	216000
Per estimated smoker per year	1593	1361	376	420	1119	698	377	471
Per estimated smoker per day	4.4	3.7	1.0	1.2	3.1	1.9	1.0	1.3

* Source: ABS 1998b.

** Cigarette smokers were 61.4% of persons 13 years and over in the Jabiru region (ABS 1996). 59.1% of the total population of Maningrida in 1991 were aged 15 years and over (ABS 1998b).

9.4 Summary

Winfield Red comprised on average 87% and Winfield Blue 8% of all cigarette orders over the eight-year study period. The orders of cigarettes per estimated smoker per day were 24.9 in 1988 and 13.4 in 1995. Loose tobacco orders per estimated smoker were 4.4g in 1988, and 1.3g in 1995. The orders of cigarettes and loose tobacco per estimated smoker appear to have declined since 1988.

10.0 DISCUSSION

10.1 Major findings

The variety of foods ordered by the Maningrida store over the study period showed a steady increase with time, but there is considerable scope for a further increase in food variety to encourage healthy food choices by people. The Maningrida store orders of fruit and vegetables over the study period suggest the supply and consumption of these foods are not optimal for good health. The Maningrida store orders for sugar over this period suggest the consumption of sugar by Maningrida people is considerably higher than for many other Australians, and not conducive to good health outcomes.

The Maningrida store orders data for tobacco over the study period suggest a decrease in per estimated smoker tobacco consumption. This will have health benefits to Maningrida residents if true.

10.2 Methodological considerations

Lee and colleagues elaborated on methodological points in their discussion of store-turnover methods (Lee *et al.* 1994a). The major advantages of this method are that it is relatively non-invasive, inexpensive and data can be collected retrospectively. Subjective assessments of diet and related cultural biases are avoided. Limitations include errors of measurement in the method itself, vagueness of wastage, dietary intake from other sources, dietary variation between individuals within the community, and uncertainty relating to the size of the population denominator.

I did not consider the waste of food, but assumed its equal distribution throughout the population of consumers. I also did not consider population fluctuation. The variety of food increased over the years, and the application of this method became more difficult over time. The method does, however, provide much useful information about diet in the community.

10.3 Factors relating to changing food orders

The major factors affecting demand for food are the price of the product,

the price of substitutes, house-hold income and the preferences of particular market segments. The major factors affecting the supply of goods are consumer demand, stock management, carrying capacity and deliveries. (McMillan 1991).

Store managers in communities like Maningrida wield considerable power over the food supply of remote Aboriginal communities (Lee *et al.* 1996a). It is important to note then, that the management of the Maningrida store did not change during the eight year study period. Consequently, changes in store food supply were not caused by changes in store management.

Some events relating to the Maningrida store from 1988 to 1995 are worth considering.

- In 1991, prices were reduced and a security camera was installed.
- In 1994, the store was renovated, and a community shuttle bus service was introduced.

The supply of store food such as frozen foods, biscuits, and eggs declined in 1991. This may relate to the installation of the security camera in 1991. However, the Australian economy was depressed in 1991, and this may have influenced on the Maningrida economy.

Many store food supplies increased after 1992. In 1991, the mark-up on chilled items was reduced by 30%, and that on grocery items by around 10%. No doubt price reductions affected demand, resulting in supply increases. Another possibility is that the Community Development Employment Project (CDEP) had a positive impact on the level of store supplies.

Before 1994, supplies of flour, sugar and canned meat declined for some time. Supplies increased after 1994, following renovation of the store and introduction of a shuttle bus service. Thanks to the shuttle bus service, people are able to buy heavy goods and large quantities of supplies. The store's renovation, involving the enhancement of storage, refrigeration, and freezing capacity, resulted in a significant improvement in store carrying capacity.

In the North Queensland health zone, it is clearly evident that the cost of basic healthy food increases as distance from urban centres increases, and that the variety of healthy foods declines in rural and remote areas (Leonard *et al.* 1997). With regard to supplies of fruit and vegetables, prolonged transit times mean that produce is often in poor condition on arrival and prone to continued rapid deterioration due to limited store-level storage facilities (Leonard *et al.* 1995).

In Maningrida, a market basket survey was conducted on 8 Oct 1997 by the Territory Health Service. According to the survey, compared to town prices, the cereal cost ratio was 1.35, fruit 1.03, vegetables 1.55, meat & eggs 1.28, and dairy 1.33.

The Aboriginal board of directors of the Arnhem Land Progress Association (ALPA) introduced a corporate nutrition policy in 1990 (McMillan

1991). In 1993 the ALPA nutrition policy was reviewed (Lee *et al.* 1996b).

No nutrition policy has been adopted in Maningrida, despite the fact that Maningrida people are quite interested in the health of the community. For example, a canteen started in 1986 for school children became so successful, it was later opened up to the entire community. A project to discourage petrol sniffing was conducted in 1992 (Burns *et al.* 1995). The Maningrida store does not stock small packages of ice-cream or chocolate, to discourage consumption of these foodstuffs. Diet Coke, artificial sweeteners, and diabetic jams began to be ordered in 1995. In 1998, juices were displayed in store refrigerators, while soft drinks were kept at room temperature to encourage the purchase of more nutritious drinks.

10.4 For better health

For aboriginal children in the Northern Territory, the major health problems are malnutrition, diarrhoeal disease, and respiratory tract infections (Walker 1994). Twenty percent of all Aboriginal children in the 'Top End' are malnourished (Ruben *et al.* 1995). In Maningrida, infectious diseases are very common amongst Aboriginal people. Maternal malnutrition has been reported to be as high as 60% in Maningrida (Burns 1995). A recent health screening of Maningrida school children by a Community Child Health Team found that 13% of the children were underweight, 12% were wasted, 8% stunted, and 10% were malnourished (Schwab 1998).

In Maningrida, the store orders (and by implication the consumption) of sugar are high, whereas the supply of fruit and vegetables is poor. Too much sugar causes tooth decay, and can lead to obesity which is related to heart disease and diabetes. Sugar contains no vitamins, minerals or fibre. It is important to cut down on sugar and soft drink consumption. In order to reduce soft drink consumption, it is good to drink plenty of water. Bottles of water were not sold in the store in Maningrida, because the water in the community is very good. In any case, I would recommend drinking more cool water or weak tea instead of soft drinks.

Fruit and vegetables are very important sources of minerals and vitamins. There are two ways in which the consumption of fruit and vegetables in Maningrida could be improved. One would be to increase the supply of fruit and vegetables in the store, the other would be to use community land more as a source of bush and traditional foods, and as a place for growing vegetables. Sweet potato, for example, would be an ideal vegetable as it is a great source of vitamin C and fibre; orange sweet potato provides beta carotene, too.

It is said that Aborigines are conservative in their choices with regard to European foods (Young 1984). And yet, their dietary preferences have adapted to the inventiveness of the food industry and they have accepted the convenience and frozen foods supplied to them in their communities.

Processed foods often contain high levels of fat, sugar, salt, and additives like preservative, and colouring. We should be concerned about these things.

There is no ideal food that is perfectly nutritionally balanced, therefore we must eat at a variety of foods. On this point it is important to note that the variety of foodstuffs available in the Maningrida store has improved significantly over the eight year study period.

I would like to continue my quantitative study of store food in Maningrida, and to focus especially on changing nutritional supply of food supply and store food since 1996.

ACKNOWLEDGEMENTS

The focus of the research I outline in this study stems from a short visit of five days duration I made in August 1988 from Japan to Maningrida at the 'Top End' of the Northern Territory.

I am professionally interested in the diet and nutrition of Indigenous people, and during this visit to Maningrida I was offered the opportunity to receive and analyze future store-food ordering records for Maningrida. I subsequently received Maningrida store records from 1988 to 1995 after I had returned to Japan.

I returned to Australia for the period 2 March to 30 December 1998 as a joint Visiting Scholar at AIATSIS and Visiting Fellow at ANU in Canberra. During this period, I analyzed the Maningrida store-food ordering records I obtained earlier in Japan, and also made a return visit to Maningrida (in September 1998). I obtained further store-food ordering records (from 1996– August 1998) during this visit to Maningrida, and plan to analyze these at a later date.

I sincerely thank the people of Maningrida for allowing me to do this research work. I also thank the staff of various organizations in Maningrida—and especially Mr. Dale Gordes, the store manager who provided the data analyzed in this study—for assisting me in various ways during this work.

I would like to thank staff of AIATSIS, and the Department of Archeology and Anthropology, Centre for Aboriginal Economic Policy Research (CAEPR), and the Statistical Consulting Unit of the Graduate School of the ANU, for their invaluable help in Canberra. I also thank staff of the Menzies School of Health Research, Territory Health Services, and the Cooperative Research Centre (CRC) for Aboriginal and Tropical Health for their assistance in Darwin.

My work in Australia has been mainly funded by the Ministry of Education in Japan. AIATSIS generously provided office facilities and other resources during my stay in Canberra, and the ANU provided detailed statistical advice for my research.

I have written this preliminary report for the people of Maningrida. I hope that this report will be of some small assistance in improving future health outcomes in Maningrida. I plan to write further about Maningrida after returning to Japan, and will endeavour to keep the people of Maningrida fully informed about this work.

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abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ANU	Australian National University
ATSIC	Aboriginal and Torres Strait Islander Commission
NHMRC	National Health and Medical Research Council

ABS

- 1996 *1994 National Aboriginal and Torres Strait Islander survey Jabiru ATSIC region.* (Catalogue no. 4196.0.00.031, ABS) Canberra: ABS.
- 1997 *The health and welfare of Australia's Aboriginal and Torres Strait Islander peoples.* (Catalogue no. 4704.0) Canberra: ABS.
- 1998a *1986 Census of population and housing, small area data.* Darwin: ABS.
- 1998b *1991 Census of population and housing, Aboriginal community profile.* (Catalogue no. 2722.7) Canberra: ABS.
- 1998c *1996 Census of population and housing.* (Catalogue no. 2901.0) Darwin: ABS.
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Appendix A: Annual gross food orders in Maningrida store*

Year	1988	1989	1990	1991	1992	1993	1994	1995
Beverages								
Soft drink (l)	63825	63975	55275	62196	76668	95984	109050	99585
Cordial (l)	7830	10533	7929	6960	10539	10344	9954	10293
Juice (l)	8244	5568	5148	8028	9552	6876	9360	9696
Other beverage (kg) ^a	349	418	330	273	335	398	394	730
Tea (kg)	2582	2506	2518	2561	2405	4018	4762	4537
Canned food								
Vegetables (kg)	3242	3926	3716	4025	4061	4683	3940	5109
Fish (kg)	3279	2710	2675	1687	2099	1152	642	1715
Fruits (kg)	2326	2989	2095	1335	1319	1767	1545	1924
Meat & vegetables (kg)	15853	16457	12944	12794	14531	11741	14703	19130
Spaghetti (kg)	4726	4900	6468	5386	6679	8052	7709	10190
Corned beef (kg)	6854	7997	7752	6854	6365	6854	9547	11587
Cooked beans (kg)	2166	3423	2348	2414	1802	3641	4608	3016
Steak pie (kg)	1846	2703	4411	2173	1862	1683	1734	2856
Total (kg)	40291	45104	42409	36667	38718	39572	44428	55527
Dairy products								
Cheese (kg)	1180	1311	709	640	855	1046	1431	1628
Milk (l)	7263	5160	5430	6300	7950	7260	9650	12410
Condensed milk (kg)	235	269	245	235	226	240	259	403
Dairy products (l) ^b	369	339	246	183	198	192	284	291
Powdered milk (kg)	8190	10380	10938	9828	10266	11052	12090	14496
Skim milk (l)	0	0	0	240	276	468	504	756
Eggs								
Eggs (kg)	6300	8640	7830	6345	7560	8100	8595	9675
Frozen food								
Cake (kg)	989	1089	729	530	601	635	1301	1933
Dinner (kg)	2332	2836	1742	1458	2167	2443	3530	5983
Vegetables (kg)	720	966	654	600	1296	1998	2220	1536
Ice cream (l)	4202	4584	2858	2196	4024	5030	4960	9082
Grain products								
Breakfast cereals (kg)	9322	10501	7281	7082	7423	8587	8842	11167
Flour (kg)	47700	55692	42404	49376	40280	39384	54668	63852
Grain products (kg)	253	351	486	345	561	440	602	603
Rice (kg)	8064	7056	6000	10080	8820	7560	12800	9115
Total (kg)	65339	73600	56171	66883	57084	55970	76911	84737
Convenience food								
Instant dinner (kg)	2443	2350	1238	1071	1619	1583	1877	2191
Instant noodles (kg)	0	0	0	1102	1316	1622	1851	2407
Instant soup (kg)	0	0	72	75	115	108	112	151
Cup noodles (kg)	0	0	0	230	480	622	753	998
Total (kg)	2443	2350	1310	2478	3530	3935	4593	5748

Meat

Ham & sausages (kg)	82	131	359	1480	1980	2506	3287	3458
Beef (kg)	12960	18300	11220	12940	12320	15700	19140	29180
Mince (kg)	1320	1620	1120	1600	1560	1000	0	0
Pork (kg)	860	820	520	500	520	520	560	980
Lamb (kg)	1720	1940	1060	1560	1600	1760	2420	2600
Sausages (kg)	0	0	0	440	280	840	2920	2040
Rissoles (kg)	0	0	0	320	0	0	0	0
Kangaroo (kg)	0	0	0	80	0	0	0	0
Chicken (kg)	2580	900	380	380	320	360	420	560
Quail (kg)	0	0	0	0	0	0	220	80
Total (kg)	19522	23711	14659	19300	18580	22686	28971	38908

Oils and fats

Butter (kg)	405	495	465	360	486	520	560	608
Margarine (kg)	3288	3936	3636	3036	3972	4500	4496	5200
Oil (l)	3276	3210	873	1029	882	891	735	1167

Seasoning

Salt (kg)	770	851	593	642	773	770	846	1338
Seasoning (kg) ^c	198	300	205	229	301	412	617	760
Vinegar (l)	18	36	45	45	9	51	51	72
Tomato sauce (kg)	648	691	648	677	677	792	936	1253

Sugars

Sugar (kg)	71085	71211	63636	61266	61290	59781	72374	83094
Honey & syrup (kg)	987	1052	1005	693	792	888	732	1106
Total (kg)	72072	72263	64641	61959	62082	60669	73106	84200

Others

Baby food (kg)	642	652	610	752	663	576	774	754
Biscuits (kg)	7453	7767	6540	5336	7747	8402	9633	11826
Jam and spread (kg)	1242	1053	1191	1019	1291	1318	1221	1592
Sweets (kg)	2089	3776	3091	3373	3574	3966	3402	5403
Others (kg) ^d	437	164	238	241	344	291	346	402
Dried fruits (kg)	403	398	403	386	299	402	502	518
Pancake mix (kg)	0	0	0	0	0	0	59	27
Total (kg)	12266	13810	12072	11108	13917	14954	15936	20521

* Source: MPA 1996.

^a Coffee, milo, strawberry quick

^b Milk portion, cream, evaporated milk

^c Steak sauce, soy sauce, tomato paste, dressing etc.

^d Baking powder, yeast, coconut cream etc.

Appendix B: Store food orders per capita per year in Maningrida

Year	1988	1989	1990	1991	1992	1993	1994	1995
Estimated population*	786	854	922	997**	1059	1127	1196	1264
Beverages								
Soft drink (l)	81.2	74.9	60.0	62.4	72.4	85.2	91.2	78.8
Cordial (l)	10.0	12.3	8.6	7.0	10.0	9.2	8.3	8.1
Juice (l)	10.5	6.5	5.6	8.1	9.0	6.1	7.8	7.7
Other beverage (kg) ^a	0.4	0.5	0.4	0.3	0.3	0.4	0.3	0.6
Tea (kg)	3.3	2.9	2.7	2.6	2.3	3.6	4.0	3.6
Canned food								
Vegetables (kg)	4.1	4.6	4.0	4.0	3.8	4.2	3.3	4.0
Fish (kg)	4.2	3.2	2.9	1.7	2.0	1.0	0.5	1.4
Fruits (kg)	3.0	3.5	2.3	1.3	1.2	1.6	1.3	1.5
Meat & vegetables (kg)	20.2	19.3	14.0	12.8	13.7	10.4	12.3	15.1
Spaghetti (kg)	6.0	5.7	7.0	5.4	6.3	7.1	6.4	8.1
Corned beef (kg)	8.7	9.4	8.4	6.9	6.0	6.1	8.0	9.2
Cooked beans (kg)	2.8	4.0	2.5	2.4	1.7	3.2	3.9	2.4
Steak pie (kg)	2.3	3.2	4.8	2.2	1.8	1.5	1.4	2.3
Total (kg)	51.3	52.8	46.0	36.8	36.6	35.1	37.1	43.9
Dairy product								
Cheese (kg)	1.5	1.5	0.8	0.6	0.8	0.9	1.2	1.3
Milk (l)	9.2	6.0	5.9	6.3	7.5	6.4	8.1	9.8
Condensed milk (kg)	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.3
Dairy products (l) ^b	0.5	0.4	0.3	0.2	0.2	0.2	0.2	0.2
Powdered milk (kg)	10.4	12.2	11.9	9.9	9.7	9.8	10.1	11.5
Skim milk (l)	0.0	0.0	0.0	0.2	0.3	0.4	0.4	0.6
Eggs								
Eggs (kg)	8.0	10.1	8.5	6.4	7.1	7.2	7.2	7.7
Frozen food								
Frozen cake (kg)	1.3	1.3	0.8	0.5	0.6	0.6	1.1	1.5
Frozen dinner (kg)	3.0	3.3	1.9	1.5	2.0	2.2	3.0	4.7
Frozen vegetables (kg)	0.9	1.1	0.7	0.6	1.2	1.8	1.9	1.2
Ice cream (l)	5.3	5.4	3.1	2.2	3.8	4.5	4.1	7.2
Grain products								
Breakfast cereals (kg)	11.9	12.3	7.9	7.1	7.0	7.6	7.4	8.8
Flour (kg)	60.7	65.2	46.0	49.5	38.0	34.9	45.7	50.5
Grain products (kg)	0.3	0.4	0.5	0.3	0.5	0.4	0.5	0.5
Rice (kg)	10.3	8.3	6.5	10.1	8.3	6.7	10.7	7.2
Total (kg)	83.1	86.2	60.9	67.1	53.9	49.7	64.3	67.0
Convenience food								
Instant dinner (kg)	3.1	2.8	1.3	1.1	1.5	1.4	1.6	1.7
Instant noodles (kg)	0.0	0.0	0.0	1.1	1.2	1.4	1.5	1.9
Instant soup (kg)	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1
Cup noodles (kg)	0.0	0.0	0.0	0.2	0.5	0.6	0.6	0.8

Total (kg)	3.1	2.8	1.4	2.5	3.3	3.5	3.8	4.5
Meat								
Ham & sausages (kg)	0.1	0.2	0.4	1.5	1.9	2.2	2.7	2.7
Beef (kg)	16.5	21.4	12.2	13.0	11.6	13.9	16.0	23.1
Mince (kg)	1.7	1.9	1.2	1.6	1.5	0.9	0.0	0.0
Pork (kg)	1.1	1.0	0.6	0.5	0.5	0.5	0.5	0.8
Lamb (kg)	2.2	2.3	1.1	1.6	1.5	1.6	2.0	2.1
Sausages (kg)	0.0	0.0	0.0	0.4	0.3	0.7	2.4	1.6
Rissoles (kg)	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Kangaroo (kg)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Chicken (kg)	3.3	1.1	0.4	0.4	0.3	0.3	0.4	0.4
Quail (kg)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1
Total (kg)	24.8	27.8	15.9	19.4	17.5	20.1	24.2	30.8
Oils and fats								
Butter (kg)	0.5	0.6	0.5	0.4	0.5	0.5	0.5	0.5
Margarine (kg)	4.2	4.6	3.9	3.0	3.8	4.0	3.8	4.1
Oil (l)	4.2	3.8	0.9	1.0	0.8	0.8	0.6	0.9
Seasoning								
Salt (kg)	1.0	1.0	0.6	0.6	0.7	0.7	0.7	1.1
Seasoning (kg) ^c	0.3	0.4	0.2	0.2	0.3	0.4	0.5	0.6
Vinegar (l)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Tomato sauce (kg)	0.8	0.8	0.7	0.7	0.6	0.7	0.8	1.0
Sugars								
Sugar (kg)	90.4	83.4	69.0	61.5	57.9	53.0	60.5	65.7
Honey & syrup (kg)	1.3	1.2	1.1	0.7	0.7	0.8	0.6	0.9
Total (kg)	91.7	84.6	70.1	62.1	58.6	53.8	61.1	66.6
Others								
Baby food (kg)	0.8	0.8	0.7	0.8	0.6	0.5	0.6	0.6
Biscuits (kg)	9.5	9.1	7.1	5.4	7.3	7.5	8.1	9.4
Jam and spread (kg)	1.6	1.2	1.3	1.0	1.2	1.2	1.0	1.3
Sweets (kg)	2.7	4.4	3.4	3.4	3.4	3.5	2.8	4.3
Others (kg) ^d	0.6	0.2	0.3	0.2	0.3	0.3	0.3	0.3
Dried fruits (kg)	0.5	0.5	0.4	0.4	0.3	0.4	0.4	0.4
Pancake mix (kg)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total (kg)	15.6	16.2	13.1	11.1	13.1	13.3	13.3	16.2

* Source: The estimated population (*Refer to the Methods section*)

** Source: ABS 1998b.

^a Coffee, milo, strawberry quick

^b Milk portion, cream, evaporated milk

^c Steak sauce, soy sauce, tomato paste, dressing etc.

^d Baking powder, yeast, coconut cream etc.

Appendix C: Store food orders per capita per day in Maningrida

Year	1988	1989	1990	1991	1992	1993	1994	1995
Estimated population*	786	854	922	997**	1059	1127	1196	1264
Beverages								
Soft drink (ml)	222.5	205.2	164.2	170.9	198.3	233.3	249.8	215.9
Cordial (ml)	27.3	33.8	23.6	19.1	27.3	25.1	22.8	22.3
Juice (ml)	28.7	17.9	15.3	22.1	24.7	16.7	21.4	21.0
Other beverage (g) ^a	1.2	1.3	1.0	0.8	0.9	1.0	0.9	1.6
Tea (g)	9.0	8.0	7.5	7.0	6.2	9.8	10.9	9.8
Canned food								
Vegetables (g)	11.3	12.6	11.0	11.1	10.5	11.4	9.0	11.1
Fish (g)	11.4	8.7	7.9	4.6	5.4	2.8	1.5	3.7
Fruits (g)	8.1	9.6	6.2	3.7	3.4	4.3	3.5	4.2
Meat & vegetables (g)	55.3	52.8	38.5	35.2	37.6	28.5	33.7	41.5
Spaghetti (g)	16.5	15.7	19.2	14.8	17.3	19.6	17.7	22.1
Corned beef (g)	23.9	25.7	23.0	18.8	16.5	16.7	21.9	25.1
Cooked beans (g)	7.5	11.0	7.0	6.6	4.7	8.9	10.6	6.5
Steak pie (g)	6.4	8.7	13.1	6.0	4.8	4.1	4.0	6.2
Total (g)	140.4	144.7	126.0	100.8	100.2	96.2	101.8	120.4
Dairy products								
Cheese (g)	4.1	4.2	2.1	1.8	2.2	2.5	3.3	3.5
Milk (ml)	25.3	16.6	16.1	17.3	20.6	17.6	22.1	26.9
Condensed milk (g)	0.8	0.9	0.7	0.6	0.6	0.6	0.6	0.9
Dairy products (ml) ^b	1.3	1.1	0.7	0.5	0.5	0.5	0.7	0.6
Powdered milk (g)	28.5	33.3	32.5	27.0	26.6	26.9	27.7	31.4
Skim milk (ml)	0.0	0.0	0.0	0.7	0.7	1.1	1.2	1.6
Eggs								
Eggs (g)	22.0	27.7	23.3	17.4	19.6	19.7	19.7	21.0
Frozen food								
Frozen cake (g)	3.4	3.5	2.2	1.5	1.6	1.5	3.0	4.2
Frozen dinner (g)	8.1	9.1	5.2	4.0	5.6	5.9	8.1	13.0
Frozen vegetables (g)	2.5	3.1	1.9	1.6	3.4	4.9	5.1	3.3
Ice cream (ml)	14.6	14.7	8.5	6.0	10.4	12.2	11.4	19.7
Grain products								
Breakfast cereals (g)	32.5	33.7	21.6	19.5	19.2	20.9	20.3	24.2
Flour (g)	166.3	178.7	126.0	135.7	104.2	95.7	125.2	138.4
Grain products (g)	0.9	1.1	1.4	0.9	1.5	1.1	1.4	1.3
Rice (g)	28.1	22.6	17.8	27.7	22.8	18.4	29.3	19.8
Total (g)	227.7	236.1	166.9	183.8	147.7	136.1	176.2	183.7
Convenience food								
Instant dinner (g)	8.5	7.5	3.7	2.9	4.2	3.8	4.3	4.7
Instant noodles (g)	0.0	0.0	0.0	3.0	3.4	3.9	4.2	5.2
Instant soup (g)	0.0	0.0	0.2	0.2	0.3	0.3	0.3	0.3
Cup noodles (g)	0.0	0.0	0.0	0.6	1.2	1.5	1.7	2.2

Total (g)	8.5	7.5	3.9	6.8	9.1	9.6	10.5	12.5
Meat								
Ham & sausages (g)	0.3	0.4	1.1	4.1	5.1	6.1	7.5	7.5
Beef (g)	45.2	58.7	33.3	35.6	31.9	38.2	43.8	63.2
Mince (g)	4.6	5.2	3.3	4.4	4.0	2.4	0.0	0.0
Pork (g)	3.0	2.6	1.5	1.4	1.3	1.3	1.3	2.1
Lamb (g)	6.0	6.2	3.1	4.3	4.1	4.3	5.5	5.6
Sausages (g)	0.0	0.0	0.0	1.2	0.7	2.0	6.7	4.4
Rissoles (g)	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0
Kangaroo (g)	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Chicken (g)	9.0	2.9	1.1	1.0	0.8	0.9	1.0	1.2
Quail (g)	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.2
Total (g)	68.0	76.1	43.6	53.0	48.1	55.1	66.4	84.3
Oils and fats								
Butter (g)	1.4	1.6	1.4	1.0	1.3	1.3	1.3	1.3
Margarine (g)	11.5	12.6	10.8	8.3	10.3	10.9	10.3	11.3
Oil (ml)	11.4	10.3	2.6	2.8	2.3	2.2	1.7	2.5
Seasoning								
Salt (g)	2.7	2.7	1.8	1.8	2.0	1.9	1.9	2.9
Seasoning (g) ^c	0.7	1.0	0.6	0.6	0.8	1.0	1.4	1.6
Vinegar (ml)	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.2
Tomato sauce (g)	2.3	2.2	1.9	1.9	1.8	1.9	2.1	2.7
Sugars								
Sugar (g)	247.8	228.5	189.1	168.4	158.6	145.3	165.8	180.1
Honey & syrup (g)	3.4	3.4	3.0	1.9	2.0	2.2	1.7	2.4
Total (g)	251.2	231.8	192.1	170.3	160.6	147.5	167.5	182.5
Others								
Baby food (g)	2.2	2.1	1.8	2.1	1.7	1.4	1.8	1.6
Biscuits (g)	26.0	24.9	19.4	14.7	20.0	20.4	22.1	25.6
Jam and spread (g)	4.3	3.4	3.5	2.8	3.3	3.2	2.8	3.4
Sweets (g)	7.3	12.1	9.2	9.3	9.2	9.6	7.8	11.7
Others (g) ^d	1.5	0.5	0.7	0.7	0.9	0.7	0.8	0.9
Dried fruits (g)	1.4	1.3	1.2	1.1	0.8	1.0	1.1	1.1
Pancake mix (g)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Total (g)	42.8	44.3	35.9	30.5	36.0	36.4	36.5	44.5

* Source: The estimated population (*Refer to the Methods section*)

** Source: ABS 1998b.

^a Coffee, milo, strawberry quick

^b Milk portion, cream, evaporated milk

^c Steak sauce, soy sauce, tomato paste, dressing etc.

^d Baking powder, yeast, coconut cream etc.

Appendix D: Conversion table of fruit and vegetables

Fruit and vegetables	Unit	Weight*	kg
ALMOND IN SHELL		400 g	0.400
ALPHALPHA	PUNNET	125 g	0.125
APPLES GRANNY SMITH	TRAY=6	each 120 g	0.750
APPLES RED	TRAY=6	each 150 g	0.900
ASPARAGUS	BUNCH	200 g	0.200
AVOCADOES	TRAY=1	200 g	0.200
BANANAS	TRAY	200 g	0.200
BASIL	BUNCH	100 g	0.100
BEAN SHOOTS	PUNNET	250 g	0.250
BEANS	TRAY	350 g	0.350
BROCCOLI	TRAY	300 g	0.300
BRUSSEL SPROUTS	TRAY	400 g	0.400
BUTTON SQUASH	TRAY	250 g	0.250
CABBAGE	1/2HEAD	600 g	0.600
CABBAGE CHINESE	1/2HEAD	600 g	0.600
CAPSICUM GREEN	TRAY=2	each 200 g	0.400
CAPSICUM RED	TRAY=2	each 200 g	0.400
CARROTS	BAG=1 KG	1 kg	1.000
CAULIFLOWER	1/2HEAD	500 g	0.500
CELERY	1/2BUNCH	700 g	0.700
CHERRY TOMATOES	PUNNET	250 g	0.250
CHILL RED BIRDS EYE	PUNNET=150 G	150 g	0.150
CHOY SUM	BUNCH	500 g	0.500
CORIANDER	BUNCH	100 g	0.100
CUCUMBER	TRAY=2	each 250 g	0.500
DILL	BUNCH=1	120 g	0.120
EGG PLANT	TRAY=1	400 g	0.400
FRUIT TRAY MIXED	TRAY	a	0.940
GAI LUM	BUNCH	500 g	0.500
GARLIC KNOB	TRAY=1	50 g	0.050
GINGER	TRAY=1 PIECE	80 g	0.080
GRAPE FRUIT	TRAY=2	each 350 g	0.700
GRAPES DARK	TRAY	350 g	0.350
GRAPES LIGHT	TRAY	350 g	0.350
HONEY DEW MELONS	EACH	1.3 kg	1.300
KIWI FRUIT	TRAY=4	each 100 g	0.400
LEMONS	TRAY=2	each 200 g	0.400
LETTUCE	HEAD	600 g	0.600
MANDARINES	TRAY=6	each 150 g	0.900
MANGOES	TRAY=2	each 300 g	0.600
MIXED NUTS	BAG	400 g ^b	0.400
MUSHROOMS	TRAY	100 g	0.100

NECTARINES		90 g	0.090
ONIONS BROWN	BAG=1 KG	1 kg	1.000
ORANGES	TRAY=6	each 200 g	1.200
PAK CHOY	BUNCH	450 g	0.450
PARSLEY	1/2BUNCH	bunsh 100 g	0.100
PASSION FRUIT	TRAY=4	each 30 g	0.120
PEANUTS	BAG	400 g ^b	0.400
PEARS	TRAY=6	each 200 g	0.200
PINEAPPLE	EACH	each 900 g	0.900
POTATOES BRUSHED	BAG=2.5 KG	2.5 kg	2.500
POTATOES CHATTS	BAG=1.0 KG	1.0 kg	1.000
PUMPKIN BUTTER NUT	EACH	800 g	0.800
ROCKMELONS	EACH	1.5 kg	1.500
SILVER BEET	BUNCH	1.0 kg	1.000
SNOW PEAS	TRAY	150 g	0.150
SOUP PACK	TRAY	c	0.680
SPRING ONIONS	BUNCH	450 g	0.450
STRAWBERRIES	PUNNET	250 g	0.250
SWEET POTATOES	TRAY	200 g	0.200
ROMA TOMATOES		each 100 g	0.100
TOMATOES	TRAY=4	each 150 g	0.600
WATER CRESS	BUNCH	500 g	0.500
WATERMELONS	1/2BIN	each 4 kg	d
ZUCCHINI	TRAY=4	each 150 g	0.600

* Measurements at Canberra markets in November 1998.

^a Apples granny smith 120 g × 2, apples red 120 g × 2, oranges 200 g × 2

^b Supposition

^c Supposition: parsnip 100 g sweed 200 g onion 150 g carrot 100 g parsely 30 g celery 100 g

^d Unknown

Appendix E: Orders of fruit and vegetables in Maningrida

Year	Annual orders (kg)*			Per capita per year (kg)			Per capita per day (g)		
	1993	1994	1995	1993	1994	1995	1993	1994	1995
Estimated population**				1127	1196	1264	1127	1196	1264
ALPHALPHA	7.3	9.9	6.9	0.0	0.0	0.0	0.0	0.0	0.0
APPLES GRANNY SMITH	1800.0	1762.5	2100.0	1.6	1.5	1.7	4.4	4.0	4.6
APPLES RED	8505.0	8640.0	7425.0	7.5	7.2	5.9	20.7	19.8	16.1
ASPARAGUS	22.8	10.8	11.8	0.0	0.0	0.0	0.1	0.0	0.0
AVOCADOES	16.8	16.2	28.2	0.0	0.0	0.0	0.0	0.0	0.1
BANANAS	360.0	496.0	902.0	0.3	0.4	0.7	0.9	1.1	2.0
BASIL	4.7	9.5	15.8	0.0	0.0	0.0	0.0	0.0	0.0
BEAN SHOOTS	30.5	22.8	29.3	0.0	0.0	0.0	0.1	0.1	0.1
BEANS GREEN	67.6	51.1	70.0	0.1	0.0	0.1	0.2	0.1	0.2
BROCCOLI	173.1	202.5	315.0	0.2	0.2	0.2	0.4	0.5	0.7
BRUSSEL SPROUTS	77.6	50.8	50.0	0.1	0.0	0.0	0.2	0.1	0.1
BUTTON SQUASH	9.0	8.0	12.8	0.0	0.0	0.0	0.0	0.0	0.0
CABBAGE	148.2	136.2	224.4	0.1	0.1	0.2	0.4	0.3	0.5
CABBAGE CHINESE	12.0	0.0	10.8	0.0	0.0	0.0	0.0	0.0	0.0
CAPSICUM GREEN	216.4	202.4	354.8	0.2	0.2	0.3	0.5	0.5	0.8
CAPSICUM RED	226.8	206.4	354.8	0.2	0.2	0.3	0.6	0.5	0.8
CARROTS	845.0	945.0	1070.0	0.7	0.8	0.8	2.1	2.2	2.3
CAULIFLOWER	132.5	116.5	172.0	0.1	0.1	0.1	0.3	0.3	0.4
CELERY	233.8	235.2	268.8	0.2	0.2	0.2	0.6	0.5	0.6
CHERRY TOMATOES	340.0	252.5	252.5	0.3	0.2	0.2	0.8	0.6	0.5
CHILL RED BIRDS EYE	6.3	3.5	0.8	0.0	0.0	0.0	0.0	0.0	0.0
CHOY SUM	41.0	26.5	34.0	0.0	0.0	0.0	0.1	0.1	0.1
CORIANDER	11.7	13.8	23.7	0.0	0.0	0.0	0.0	0.0	0.1
CUCUMBER	133.0	123.0	185.0	0.1	0.1	0.1	0.3	0.3	0.4
DILL	5.9	6.7	12.4	0.0	0.0	0.0	0.0	0.0	0.0
EGG PLANT	21.6	18.0	26.0	0.0	0.0	0.0	0.1	0.0	0.1
FRUIT TRAY MIXED	2209.0	2021.0	4371.0	2.0	1.7	3.5	5.4	4.6	9.5
GAI LUM	31.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
GARLIC KNOB	6.6	5.9	8.6	0.0	0.0	0.0	0.0	0.0	0.0
GINGER	6.8	4.3	8.6	0.0	0.0	0.0	0.0	0.0	0.0
GRAPE FRUIT	50.4	50.4	54.6	0.0	0.0	0.0	0.1	0.1	0.1
GRAPES DARK	234.5	280.0	350.0	0.2	0.2	0.3	0.6	0.6	0.8
GRAPES LIGHT	234.5	294.0	350.0	0.2	0.2	0.3	0.6	0.7	0.8
HONEY DEW MELONS	111.8	57.2	81.9	0.1	0.0	0.1	0.3	0.1	0.2
KIWI FRUIT	89.2	75.2	57.2	0.1	0.1	0.0	0.2	0.2	0.1
LEMONS	59.2	52.0	70.0	0.1	0.0	0.1	0.1	0.1	0.2
LETTUCE	357.6	336.0	528.0	0.3	0.3	0.4	0.9	0.8	1.1
MANDARINES	1890.0	1305.0	1845.0	1.7	1.1	1.5	4.6	3.0	4.0

MANGOES	78.0	150.0	72.0	0.1	0.1	0.1	0.2	0.3	0.2
MIXED NUTS	1060.0	656.0	336.0	0.9	0.5	0.3	2.6	1.5	0.7
MUSHROOMS	32.8	24.6	39.0	0.0	0.0	0.0	0.1	0.1	0.1
ONIONS BROWN	2100.0	2650.0	3360.0	1.9	2.2	2.7	5.1	6.1	7.3
ORANGES	13140.0	12960.0	10080.0	11.7	10.8	8.0	31.9	29.7	21.8
PAK CHOY	36.0	22.1	36.5	0.0	0.0	0.0	0.1	0.1	0.1
PARSLEY	8.0	10.0	13.9	0.0	0.0	0.0	0.0	0.0	0.0
PASSION FRUIT	20.9	14.4	18.2	0.0	0.0	0.0	0.1	0.0	0.0
PEANUTS	560.0	992.0	304.0	0.5	0.8	0.2	1.4	2.3	0.7
PEARS	730.0	180.0	0.0	0.6	0.2	0.0	1.8	0.4	0.0
PINEAPPLE	81.9	42.3	56.7	0.1	0.0	0.0	0.2	0.1	0.1
POTATOES BRUSHED	5325.0	6275.0	6125.0	4.7	5.2	4.8	12.9	14.4	13.3
POTATOES CHATTS	330.0	675.0	720.0	0.3	0.6	0.6	0.8	1.5	1.6
PUMPKIN BUTTER NUT	444.0	580.0	708.0	0.4	0.5	0.6	1.1	1.3	1.5
ROCKMELONS	844.5	858.0	966.0	0.7	0.7	0.8	2.1	2.0	2.1
SILVER BEET	86.0	122.0	220.0	0.1	0.1	0.2	0.2	0.3	0.5
SNOW PEAS	31.7	22.7	32.0	0.0	0.0	0.0	0.1	0.1	0.1
SOUP PACK	160.5	428.4	360.4	0.1	0.4	0.3	0.4	1.0	0.8
SPRING ONIONS	153.5	139.5	226.8	0.1	0.1	0.2	0.4	0.3	0.5
STRAWBERRIES	325.0	390.0	445.0	0.3	0.3	0.4	0.8	0.9	1.0
SWEET POTATOES	56.8	71.6	125.6	0.1	0.1	0.1	0.1	0.2	0.3
ROMA TOMATOES	0.0	19.0	36.0	0.0	0.0	0.0	0.0	0.0	0.1
TOMATOES	1170.0	918.0	1638.0	1.0	0.8	1.3	2.8	2.1	3.6
WATER CRESS	17.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
WATERMELONS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ZUCCHINI	61.8	64.8	92.4	0.1	0.1	0.1	0.2	0.1	0.2
TOTAL	45582.3	46312.0	47692.9	40.4	38.7	37.7	110.8	106.1	103.4

* Source: MPA 1996.

** Refer to the Methods section